Railway Age

AND RAILWAY REVIEW

FIRST HALF OF 1928—No. 10 MARCH 10, 1928 SEVENTY-THIRD YEAR

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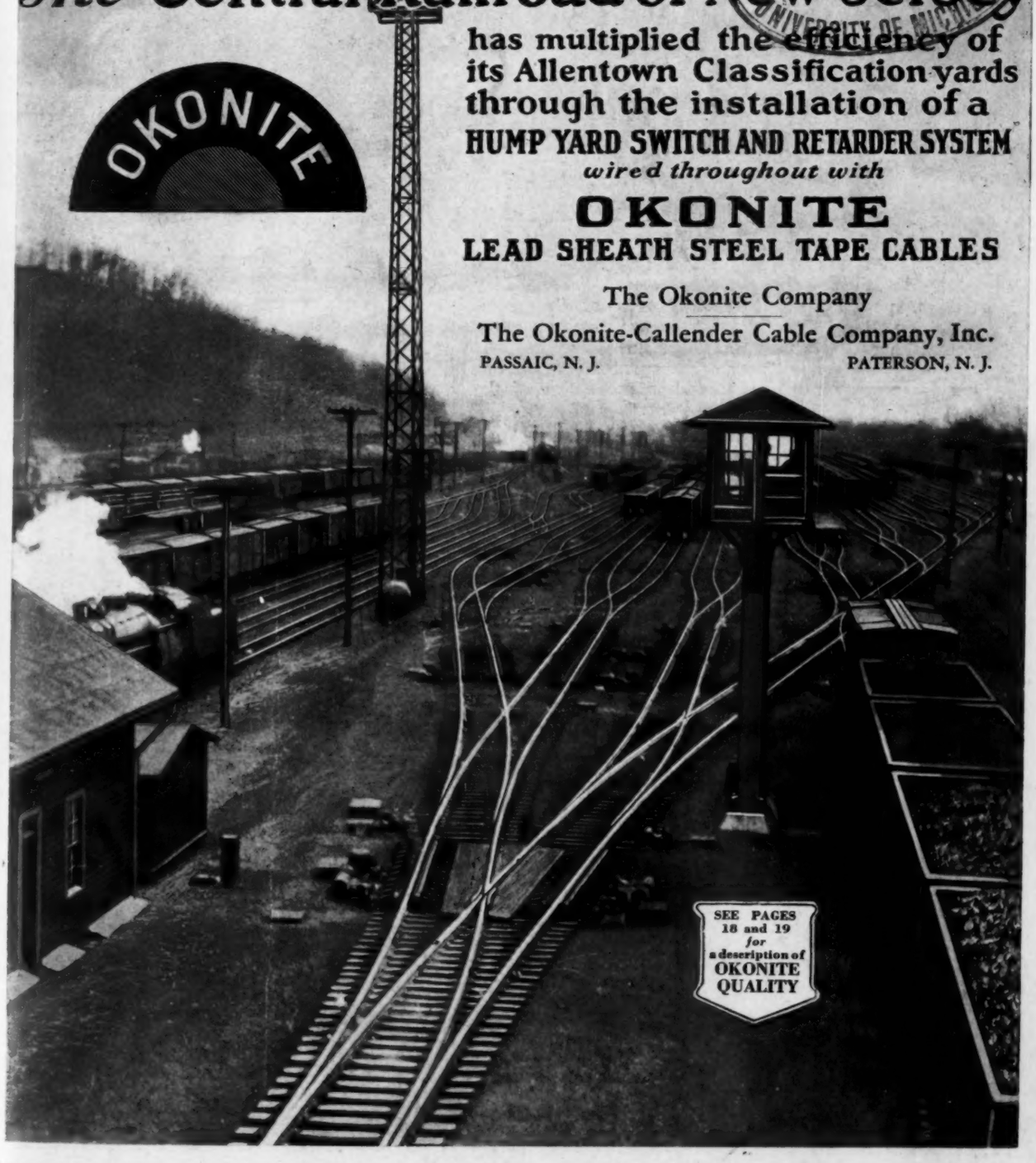

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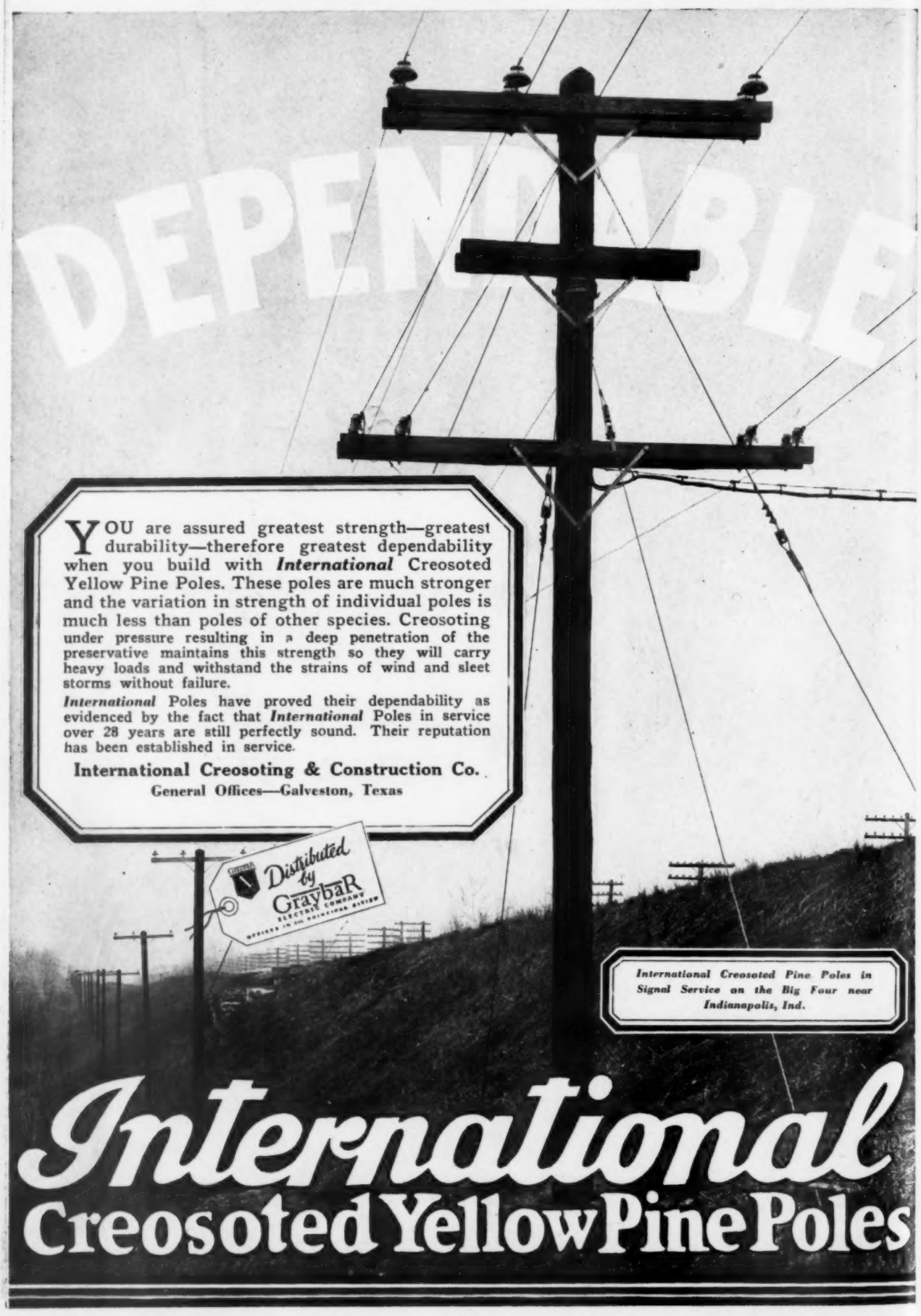
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Railway Age

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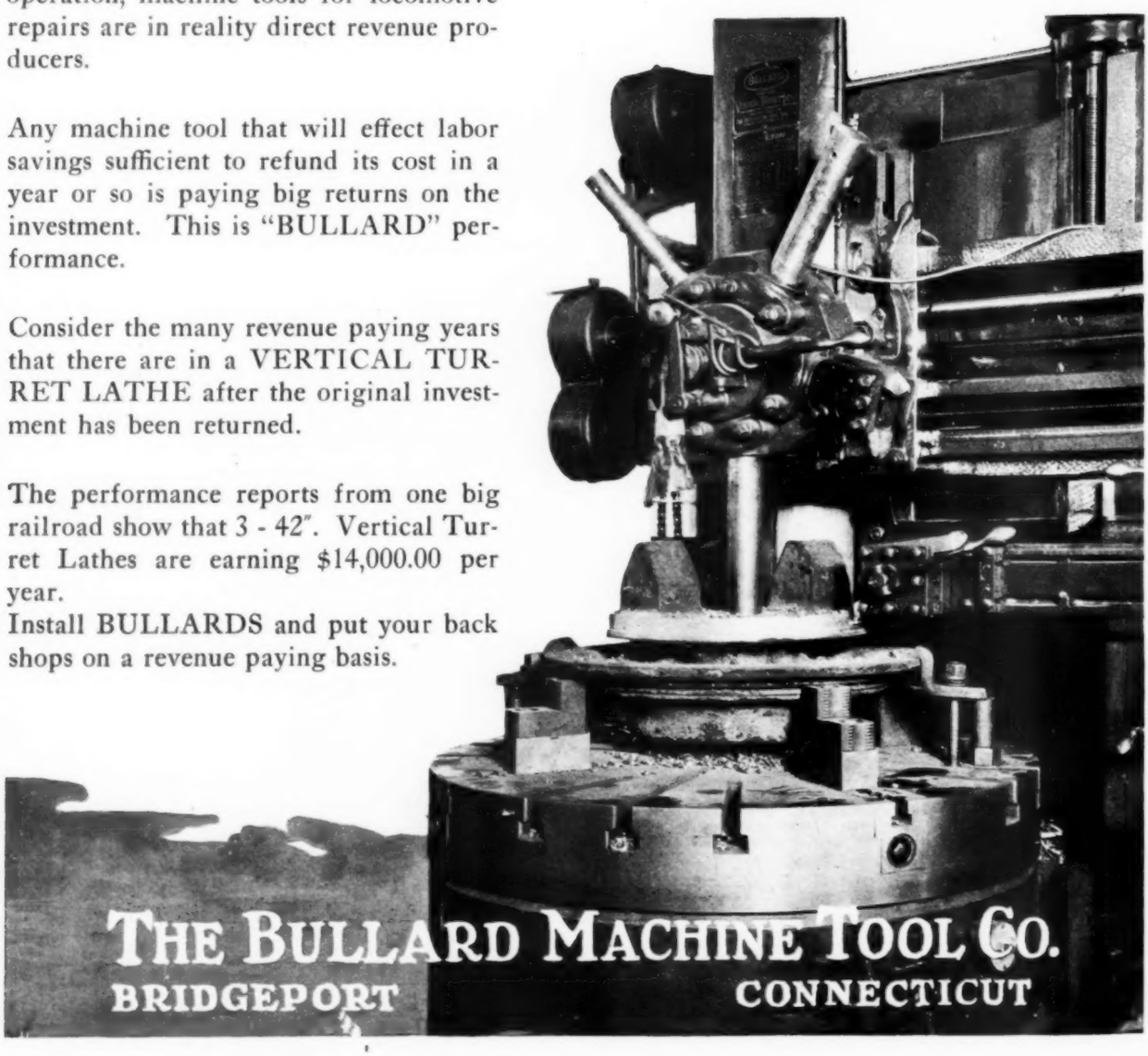

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Railway Age

Vol. 84, No. 10 March 10, 1928 Table of Contents Appears on Page 5 of Advertising Section

Why the Locomotive Auxiliary?

APPEARING elsewhere in this issue is an abstract of a paper by C. A. Brandt, chief engineer, Superheater Company, which was presented at the February meeting of the Canadian Railway Club. Although the subject of Mr. Brandt's paper includes only the boiler, still it is the output of the boiler that finally determines the capacity of the locomotive. Many items pertaining to boiler capacity, such as the inadequacy of using Cole's ratios in estimating the power output of the modern locomotive; and the effect of the superheater and the feedwater heater, on boiler output are discussed. A careful reading of the article will not only show the importance of these two auxiliaries, but will also provide a background in the mind of the reader that will show the value of auxiliaries such as the syphon, stoker, back pressure gage and others. Executive and operating officers will find much in Mr. Brandt's paper that will help to answer that question often asked, "Why so many locomotive auxiliaries?" The modern locomotive is a highly economical producer of horsepower; without modern auxiliaries it is neither a modern nor an economical locomotive.

Timely Topics for Addresses

MANY of the most serious problems which railroads meet they have to face together, and not singly: Labor relations, rate regulation, technical advancement, motor vehicle competition—all these questions are met by all railways, and solution must generally be found in co-operative action. And in all of them the question of public relations enters. Yet public relations problems are so extensive and so complex that specialized organizations or departments cannot solve all of them unaided. Every railroad man, regardless of his regular job, has the opportunity frequently or occasionally to do some public relations work. Perhaps this may consist only of defending the railroads in conversation with some ill-informed critic. Perhaps it may consist of dealing with a passenger or shipper in a way to make him a steadfast friend of the railroad. Perhaps some organization may ask a railroad man to speak on railroad problems. What shall he say—give facts about the improvement in railroad service for passengers and freight, the decline in accidents and freight claims, the railroads' position on motor transport regulation, or what? The emphasis in such addresses may well be laid on those questions which are "in the news"—be they rates, wages, regulation, improved service, competition, greater safety or something else. The problem of adequate earnings we have always with us. Greater efficiency in freight service is now well recognized. Other matters may suggest themselves, but there are two questions, at least, which are very pressing and for which greater public recognition is needed. We refer to the improvements in passenger service in the last few years and the railroad attitude toward motor vehicle regulation. Railroad men who will aid in conveying adequate messages on these subjects to the public will not only be doing well for their own companies but will also be helping the industry as a whole.

Rail Motor Cars Reliable

REVISED figures for rail motor car orders in 1927 indicate that a total of 156 individual units of this class of equipment were ordered for service on 28 railroads in the United States. The increasing popularity of the gas-electric type of drive is evidenced by the fact that all but six of the cars were ordered equipped for operation with gas-electric power plants. Inasmuch as safety and reliability are the first requisites of railroad passenger and freight carrying equipment, the large number of rail cars ordered in 1927 is quite conclusive evidence that difficulties in the daily operation of this class of equipment have been practically overcome. Many individual records bear out this conclusion. Rail motor car No. 101, according to the Boston & Maine Employees' Magazine, "was in service for nine months and three days without losing a day and without failure of the car." Two cars on the Mobile & Ohio, operating a distance of 251 miles a day, made a total of 169,174 miles in a period of 12 months, the ratio of actual to scheduled mileage being 98.6 per cent. Four cars on another railroad operated 250 miles a day for six months, making 99.7 per cent of the scheduled mileage. Nine cars on still another road made a total of 384,000 miles with but four failures, three of which were due to poor inspection. Performances such as these are a real tribute to those who design and build rail motor cars as well as to the railroads which operate them, for without adequate inspection and care no piece of equipment can long give satisfactory service.

The Next Step in Air Transport

THERE are numerous indications that the next major step in the development of air transportation in the United States will be the inauguration of extensive air passenger service. In Europe the development of passenger service by airplane preceded and still overshadows air mail, express and freight service, but in this country the initial effort was directed toward the establishment of air mail and express routes. The network of air mail routes in operation, or soon to be in operation, now rather thoroughly covers the principal cities of the country. The further extension of air mail service is anticipated, but not with the rapidity which has characterized the recent history of the service. Air passenger service has still, however, received little attention. One or two lines, notably the one between Detroit, Mich., and Cleve-

land, Ohio, make a specialty of the transportation of passengers and certain of the air mail contractors carry passengers in the mail planes, but there is still a minimum of air transportation of passengers in this country. This summer, however, should see a widespread expansion of such service. Several projects have already been announced, including a proposed air passenger line between New York, Chicago, St. Louis and Kansas City, another between Chicago and San Francisco, and two others extending the length of the Pacific coast. How successful these lines will be is a question. However, such a development was bound to come sooner or later and the railways will doubtless find it interesting to keep a check on the results.

Leadership Qualifications

WE get much inspiration and help from the study of the lives of successful leaders in our vocations or professions. Realizing this, the American Society of Mechanical Engineers, for instance, assigned to a special committee a few years ago the task of developing some plan to make available biographies of outstanding leaders in that profession. It is exceedingly important, however, to consider the conditions under which these men lived and worked. A railroad officer recently justified a certain action in dealing with his men, which would be termed "hard-boiled" by most people, on the basis that a former successful railroad officer of wide reputation had used the same tactics under similar conditions. He failed to recognize the great change in conditions of all sorts—economic, industrial, social and political—which have taken place in the intervening quarter century, and which are reflected in changed management-employee relationships. Dean William R. Gray, of the Amos Tuck School of Administration and Finance, Dartmouth College, made a statement recently in discussing the leadership problem which merits the most careful consideration. He said: "The point of it is that we are engaged in affairs so intricate, so delicately adjusted, so far-reaching, that we cannot afford to be diverted by traditional notions from the realities of what is going on. Our specifications of leadership must be kept in line and in tune with the changing requirements that are continually evolving. Just as our appraisal of the leadership of the present must give greater weight to scope and refinements of intellectual equipment, as compared with the more elemental attributes of leadership in former times, so must our present conceptions be prepared to give way before the exactions of a future order."

After Eight Years

ON March 1 the Transportation Act had been on the statute books eight years. The *Railway Age* is among those who advocated practically all its provisions and after its passage defended it as a wise and constructive piece of legislation. We were optimistic enough to believe it laid down a policy and provided means of carrying it out which would result in a solution of the railroad problem. That optimism has not been justified by developments. A real solution of the railroad problem seems no more near and certain now than it did eight years ago. If it is to be solved under private ownership, those who want to see it thus solved will have to make new and much more united and energetic efforts to secure the kind of regulation in which it was assumed the passage of the Transportation Act would result.

The principal provisions of the Transportation Act were those relating to consolidations, issuance of securities, labor disputes and rate making. The consolidation provisions have proved unworkable and should be amended to authorize entirely voluntary consolidations subject to the approval of the Interstate Commerce Commission. The provision requiring the issuance of securities to be approved by the Interstate Commerce Commission was needed, and there has been very little criticism of its administration. On the whole its results have been satisfactory to both the railways and the public.

The original labor provisions creating a Railroad Labor Board seemed at first to provide the best means ever tried for settling disputes regarding wages and working conditions. They were broken down by efforts of both certain railways and labor unions to escape the jurisdiction of the Railroad Labor Board. The Watson-Parker Railway Labor Act was substituted for them after having received the support of the labor unions and most of the railways. Almost every arbitration under it has resulted in an award of higher wages. Wages have been increasing slowly but steadily ever since 1923. The advance in the average wage per hour between 1923 and 1927 made the pay roll last year at least $150,000,000 larger than it otherwise would have been and was one of the principal causes of the decline that occurred in the net return earned. Arbitration boards have continued up to the present time to award advances in wages in spite of declines that have been occurring in gross and net earnings for almost a year. Neither labor leaders nor most arbitrators seem to care much about the probable effects upon railway net return and development.

Failure of Section 15-A

The part of the Transportation Act that has most completely failed to produce the results expected is Section 15-A, which contains the rate making and recapture provisions. The experience which caused the adoption of these provisions and their purpose were well understood when they were adopted and have been ever since. For some years before the adoption of government operation rates had been so regulated that the percentage of return earned by the railways had declined, with a resulting decline in the expansion of their facilities.

With both wages and prices advancing, the railways had tried to secure advances in their rates, but usually in vain. One of the principal arguments effectively used was that if rates were advanced the stronger railroads in each large group would be able to earn more than a fair return. The rate-making provisions of Section 15-A were adopted as a mandate to the Interstate Commerce Commission to so regulate rates as to enable the railways of each large group to earn on the average a fair return. The recapture provisions were adopted to recover from the more prosperous roads one-half of all they earned in excess of 6 per cent on a fair valuation.

The Interstate Commerce Commission has persistently failed and refused to regulate rates in accordance with the rate-making provisions. At the same time it has sought and is still seeking to recapture earnings from the more prosperous roads. The result is that Section 15-A is a failure in a double sense. First, the railways have failed to earn on the average the return prescribed and anticipated. During the last seven years

the percentage earned on property investment has averaged less than during the last seven years before government operation was adopted. Secondly, if the Interstate Commerce Commission succeeds in its efforts to recapture earnings, the average return allowed to be kept by the roads as a whole will be further reduced. The net result of Section 15-A, as administered, will be that it will do harm to the more prosperous roads and no good to other roads.

That Section 15-A was intended or expected to be applied in this way nobody will contend. As the Supreme Court of the United States pointed out in its decision in the Dayton Goose Creek case, all the provisions of Section 15-A were intended to be considered together, and when it results both in the railways as a whole failing to earn a fair return and in earnings being recaptured from some of them, it becomes restrictive to some and constructive as to none. The outcome is due, not to the provisions of Section 15-A, but to its administration by the commission. The commission ordered excessive reductions of rates in 1922, especially in western territory, and its policy since then has been not to remedy but to aggravate the resulting situation. In western territory it has persistently regulated rates in plain disregard of the provisions of law and the needs of the railways.

Recent Decline of Net Return

Until recently the Commission's policy did not produce sufficiently adverse effects to cause general alarm among railway managers or concern to business men and the public. Believing that within a reasonable time the railways would be allowed to earn the return contemplated by the Transportation Act, their managers proceeded by large expenditures to make improvements in railway facilities which have resulted in increased economy of operation and good and adequate service. This has been especially true in the east and south, where the railways have been more prosperous than in the west. The large decline in net operating income that occurred in 1927, however, and the prospect of its continuance at least throughout the early months of 1928, should arouse railway executives, railway employees, the Interstate Commerce Commission and business men to a much needed realization of the plain fact that prevailing tendencies in the railroad industry are and for some time have been of a dangerous character and unless arrested will have most serious consequences.

The present inflation of security prices due to low interest rates and speculation should not be allowed to obscure the really important features of the situation. The percentage of return earned on property investment by the roads as a whole last year was the smallest since 1922, excepting possibly that of 1924, although the freight business handled was larger than in any previous year excepting 1926. Present tendencies are the same as those which caused the great decline of railway development before the Transportation Act was passed, and in time would inevitably have the same disastrous consequences.

What should be done? There are two pieces of legislation that are needed,—one to provide for voluntary consolidations, the other to repeal the Hoch-Smith resolution, which hangs as a menace over the freight rate structures of many railways. The principal trouble, however, is not with existing laws, but with their administration. The railways must appeal to the public, to taxing authorities, to arbitration boards, to the Interstate Commerce Commission and, if necessary, to the courts, for an administration of existing laws that will arrest the tendencies of taxation, wage fixing and rate making that are responsible for the recent serious decline in net return. There has not been a time since the Transportation Act was passed when there was more evident need than there is now for united and energetic action by the railways to secure better treatment from taxing and regulating authorities. If the needed action is delayed or is ineffective, it will be only a comparatively short time until both the public and the railways will pay dearly for it in impaired railway credit and deteriorated transportation service.

Using Freight Rates to Equalize Prosperity

SENATOR Carter Glass of Virginia has introduced a resolution to repeal the Hoch-Smith resolution. Senator Glass' resolution ought to be passed. The recent discussion of the Hoch-Smith resolution in the Senate has arisen out of the controversy over confirmation of the reappointment of Commissioner Esch. The question which has been most mooted is as to whether this resolution empowers and directs the Interstate Commerce Commission to so regulate freight rates as to tend to equalize the prosperity of different industries. That this is exactly what it does, at least as it has been interpreted by the commission, was pointed out by the *Railway Age* long ago, and especially in an editorial entitled "Using Freight Rates to Regulate Business Profits," which was published in our issue for September 17, 1927.

The intent of the resolution and the effects it would produce if carried out seem to be made plain by its language. Its opening paragraph says, "That it is hereby declared to be the true policy in rate-making to be pursued by the Interstate Commerce Commission in adjusting freight rates, that the conditions which at any given time prevail in our several industries should be considered, in so far as it is legally possible to do so, to the end that commodities may move freely." What "conditions" are meant? Almost every rational person would answer at once, "conditions" of depression or prosperity, and any doubt that these are the conditions meant should be removed by the specific reference in the last paragraph of the resolution to "the existing depression in agriculture." After having been directed in the first paragraph to consider, in adjusting freight rates, the "conditions which at any given time prevail in our several industries," the commission is particularly enjoined in the last paragraph to make on the products of agriculture "the lowest possible lawful rates compatible with the maintenance of adequate transportation service." In an intermediate paragraph it is directed to conduct a general investigation of the entire freight rate structure, and "to make in accordance with law, such changes, adjustments, and redistribution of rates and charges as may be found necessary to correct any defects so found to exist."

Adjusting "Lawful Rates" to "Conditions"

There repeatedly appear in the resolution clauses indicating that any freight rates made under the resolution must be "lawful". The Act to Regulate Commerce requires all freight rates to be just, reasonable and nondiscriminatory, and also such, as a whole, as to enable the railways to earn a fair return. Of course, if the resolution means that the commission, in the regulation

of rates, is to do exactly what it would have done if the resolution had not been passed, then the resolution means nothing at all. Necessarily, however, a regulating body has discretion in fixing rates within the zone of justice and reasonableness because there is no exact measure of a just and reasonable rate. It appears plain, therefore, that the interpretation that must be put upon the resolution, if it is to be given any effect, is that the commission, in the exercise of its discretionary authority, shall make rates as low as lawfully possible on the products of industries that are depressed and compensatingly high on those of industries that are prosperous.

It was inevitable that the commission, as the creature and agent of Congress, would assume that Congress meant something when it solemnly passed a resolution declaring what was "the true policy in rate making to be pursued," especially in view of the fact that the resolution required a wholesale investigation of the entire freight rate structure of the United States. It was generally assumed that the Commission would devote itself to finding ways to reduce rates on farm products and to make compensating advances on other commodities. But the resolution did not say this was what it was to do. Probably its authors believed a resolution that did say this would be held unconstitutional, as plainly requiring the commission to discriminate in favor of farm products and against all other commodities. As a result of the general wording of the resolution the first order issued by the commission under it was one making freight rates lower on coal produced in union mines in Pennsylvania and Ohio, as compared with coal produced in non-union mines at lower wages in mines farther south.

The *Railway Age* criticized this order at the time upon the ground that it was not even in conformity with the Hoch-Smith resolution, which evidently intended that the commission should discriminate in fixing rates upon the products of different industries, whereas, in this instance, it discriminated in fixing rates upon the products of two parts of the same industry.

This, however, of course, raises the question of what is an industry. Is mining one kind of bituminous coal one industry, and mining another kind of bituminous coal another industry? Is mining bituminous one industry, and mining anthracite another? Are grape-growing and cheese-making both parts of a single agricultural industry, or are they different industries? If growing corn is unprofitable and growing hogs on the same farm is profitable, shall the commission hold that they are different industries, and reduce rates on corn and raise them on hogs, or shall it reduce them on both corn and hogs because of an alleged "depression in agriculture"?

These questions make clear the most pernicious and dangerous feature of the Hoch-Smith resolution. This is that it requires the commission to look beyond the commodities the railways transport to the industries that produce them. Formerly it was accepted as sound economic principle that rates should be made in accordance with the cost of transporting commodities, the value of the commodities transported and transportation and market competition. It was never assumed that a commodity that was costly to handle or was of large value per ton should be hauled at an extraordinarily low rate simply because the producer or shipper of it was making very little profit or actually losing money by producing or shipping it. Under the Hoch-Smith resolution the commission must inquire if the producers of a given commodity are making small or large profits. If the former, it must give them low rates. If the latter, presumably it may make them pay the highest possible lawful rates. It is not authorized to allow itself to be influenced by consideration of why an industry is depressed or prosperous. It found that the union mine operators in Pennsylvania and Ohio were not doing as well as the non-union mine operators in the southern field. The principal reason was that the former were paying higher wages that the latter. Regardless of the reason for the difference in their "condition" the commission ordered that the rates of the former should be reduced and that the rates of the latter should not be. The grape growers of California had overproduced so vastly to meet the demands created by prohibition that they were suffering from depression. Therefore, the commission ordered their rates reduced. If it is to be consistent it must compensate the railways by ordering an advance in the rates upon the products of some industry that is prosperous.

A General Inquisition into Profits

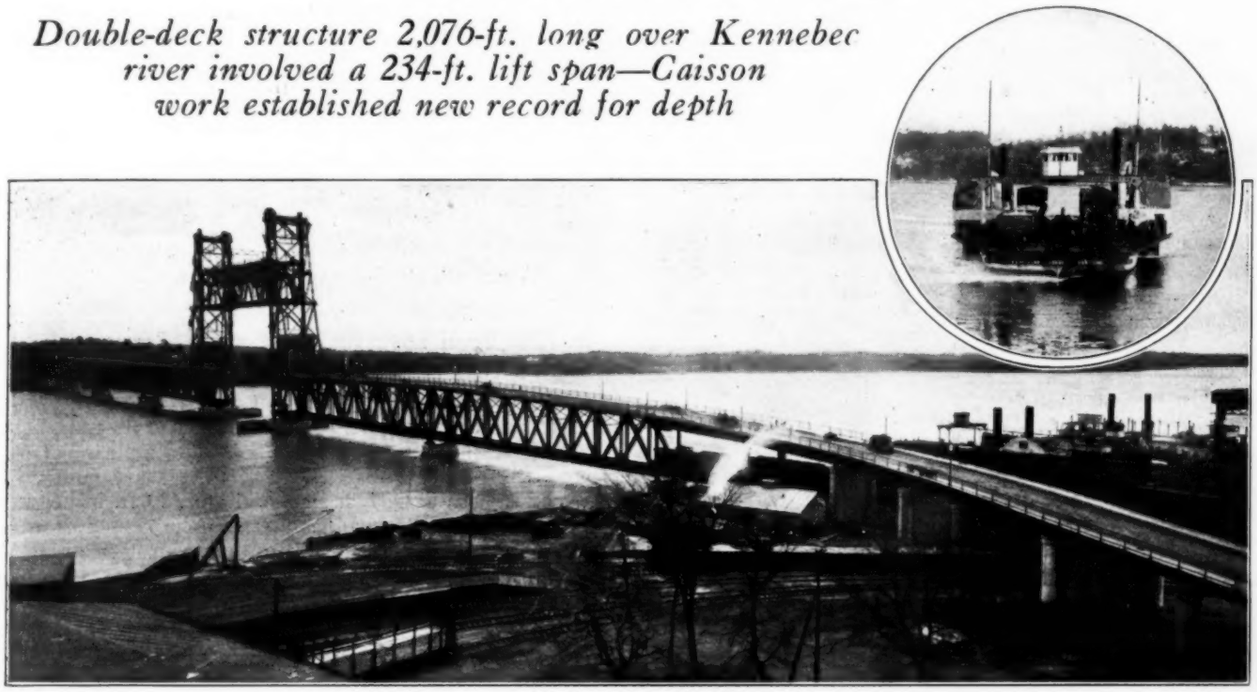
Obviously, this means that if the commission is to carry out the Hoch-Smith resolution in accordance with its apparent meaning, it must conduct an inquisition to determine the relative profits being made by every large industry in the country. It is sure to find the profits being made in some industries low. If it decides they are low in the agricultural industry or in important parts of it, for example, and consequently orders reductions of rates, then, of course, it must go on and investigate the meat packing industry, the automobile industry, the iron ore mining industry and others, including possibly the bootlegging industry, until it finds some whose profits plainly would enable them to stand higher freight rates. It is to use freight rates to mitigate adversity and penalize prosperity entirely regardless of the reasons for them.

Is this what the public and Congress want the commission to do? The commission now so regulates railway rates as to regulate railway profits. Do the public and Congress want it to so adjust freight rates as also, in so far as they are affected by freight rates, to regulate profits in all other industries? Do they realize that if it is to do this it must either gain access to the books of concerns in every kind of industry or fix the rates to be paid upon their products in accordance with mere guesses as to what their profits are? Have they stopped to consider that the profits in the various industries fluctuate greatly, and that if freight rates are to be based on "the conditions which at any given time prevail in our several industries" the commission will be kept busy juggling freight rates in accordance with fluctuations in profits?

The Hoch-Smith resolution was passed as a political sop to the farmers with almost no consideration or discussion of the meaning of its provisions. It is the most pernicious and indefensible piece of railway legislation ever passed by Congress. As long as the commission uses it as a reason merely for reducing railway rates and earnings the outcry against it will come principally from railway sources, but when the commission begins, if it ever does, to try to advance rates to compensate for reductions made under it, there will be an outcry against it which will make that recently raised seem like a profound silence. The Hoch-Smith resolution ought to be repealed because the federal law regarding the regulation of rates was fair and sufficient before it was passed, and because every provision of it which can be interpreted as having any meaning tends to cause regulation which would be unsound in principle and unjust and harmful in effect.

New Bridge Replaces Car Ferry on the Maine Central

Double-deck structure 2,076-ft. long over Kennebec river involved a 234-ft. lift span—Caisson work established new record for depth



The New and the Old Methods of Crossing the Kennebec River.

ANOTHER relic of early railroading passed into the discard recently when the new Carlton railway-highway bridge on the Maine Central was completed across the Kennebec river at Bath, Maine, replacing the ferries which regularly transferred all railway and highway traffic at that point. The new bridge, which has a total length of 2,076 ft., is a double-deck structure, carrying a single track on the lower deck, and a 20 ft. roadway with two five-foot sidewalks on the upper deck. The bridge proper is made up of three 330-ft. truss spans, three 275-ft. truss spans, and a 234-ft. vertical lift truss span which is flanked on each end by a supporting tower 220 ft. high. Supplementing the bridge proper are a 427-ft. highway approach viaduct and a 76-ft. railway approach girder span at the Bath or west end, and a 597-ft. highway viaduct and a 68-ft. railway approach girder span at the east end. The entire project involved the construction of about 7,000 ft. of new railroad track and approximately 5,000 ft. of new highway, and cost in the neighborhood of $3,000,000.

The bridge as a whole is not an unusually large or complicated structure, from the standpoint of either design or construction, but, like most bridges of its size, involved a number of difficult problems in both design and construction and incorporated a number of interesting features. The most difficult problem encountered was the caisson work in connection with the construction of the piers, one of the piers extending to a foundation 118.7 ft. below the mean tide level of the river, and thus establishing a new depth record for pneumatic bridge pier construction in this country. Other interesting features of the bridge include the great weight of the lift span combined with its extreme narrowness, the lift span supporting towers, the double-deck arrangement of the bridge itself, and the fact that both decks are constructed on a one per cent grade, resulting in a difference in elevation of about 21 ft. at opposite ends of the bridge.

Previous to the completion of the new bridge, which was opened to railway traffic on October 24, 1927, and to highway traffic on November 15, 1927, all traffic across the river was by ferry, highway vehicles and pedestrians being carried by ferries operated by the state, and railroad equipment by a steel car ferry owned and operated by the Maine Central. In both cases the ferries were of small capacity and caused considerable delay to traffic. This was true particularly of highway traffic which, during certain seasons of the year was often delayed for more than two hours, in spite of the fact that the actual time of making the crossing was only about ten minutes. To a large extent the ferry transfers also caused delays and expense in the operation of the Maine Central, although this affected only four passenger trains and about three freight trains each way daily. The length of the train delays incurred was dependent almost entirely upon the length of the individual trains as the car ferry was limited in capacity to about nine to twelve freight cars or from six to nine passenger cars. The actual delay encountered by each train amounted usually to about 30 or 40 minutes. Added to this was the expense of maintaining switching service on both sides of the river.

The site selected for the new bridge was one suggested by the Maine Central in which the center line of the bridge crosses the river approximately at right angles to its course and, as extended on the west end, passes through the existing yard of the Maine Central at Bath, directly in front of the Bath passenger station. The bridge strikes the east shore of the river at a point about one-half mile below the town of Woolwich, a village of about 900 population. The track approaches at each end of the bridge are entirely of earthwork, with the excep-

tion of a single girder span at each end, and are practically straight in the immediate vicinity of the bridge, while the highway approaches, which in each instance are carried on viaducts, curve to the north to connect with streets in Bath, and with a new road which leads to an old road near Woolwich.

General Description of Bridge

All of the trusses of the bridge are of the Warren type with riveted connections, and with cover plates on all web

Floating One of the River Spans Into Place

diagonals. The main members of each truss and the laterals are fabricated of silicon steel, and the remainder of the structure is of carbon structural steel. The basic unit stress used for the silicon steel was 24,000 lb. per sq. in. and for the carbon steel, 16,000 lb. per sq. in.

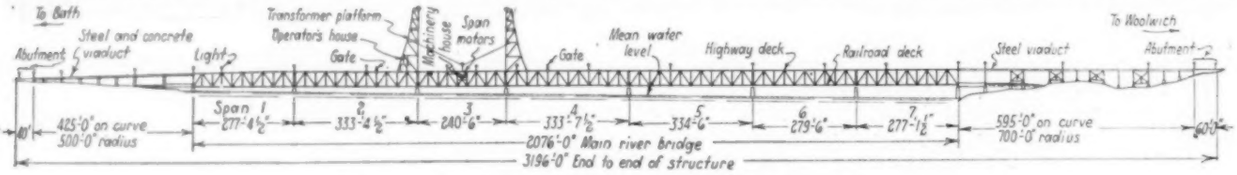
Both decks of the bridge proper are on a one per cent grade with the single exception of the highway deck on the west or Bath shore span. In this span the top chords

walks consist of a 4-in. reinforced concrete slab with a ¾-in. wearing surface. In each case the walkways drain toward the roadway, which is fitted with one-piece cast iron inlets and drain pipes along the curbs at the center of each panel. The railings along the outside of the sidewalks are made up of two rows of 3-in., extra-strength steel pipe, drilled for ⅞-in. round spindles which are electrically welded in place.

The construction of the bridge superstructure involved few special difficulties except that, on account of the grade on the bridge, all spans had to be erected and floated at different elevations. All of the river spans were erected on special falsework along the river bank, about a mile from the bridge site. When completed and ready to be moved into position, lighters were floated under them at low water, and the incoming tide was utilized to raise the spans from their temporary seats. When afloat, the spans were towed into proper position and set on the piers as the tide receded.

Lift Span Involves Interesting Features

The lift span is 234 ft. long and, like the fixed spans, is of the Warren type. This span affords a 200-ft. clear channel, and operating between the towers at its ends, has a normal vertical lift of 124 ft., providing a clear height of 135 ft. for the waterway. The towers are built entirely of structural carbon steel and are 220 ft. in height from the top of the channel piers to the center of the shafts of the main sheaves. In order to provide greater stability for the high towers, a greater width for the counterweights, and an unobstructed roadway and sidewalks, the tower columns were placed 33 ft. center to center so as to fall entirely outside of the roadway deck.



General Layout of the River Bridge and Approaches

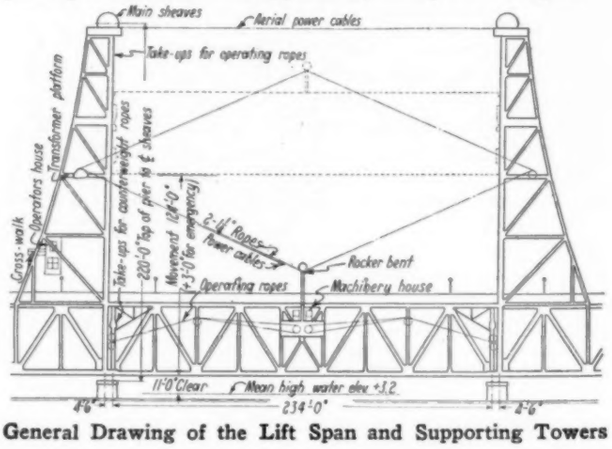
of the trusses are not parallel with the lower chords, but are curved downward to conform with a vertical curve in the highway approach grade.

The bridge was designed to carry Cooper's E 60 loading plus the A.R.E.A. standard highway loading with 15-ton trucks. The distance center to center of trusses is 18 ft. 6 in., while the center to center distance between the chords of each truss, with the exception of that in the west shore span, is 42 ft. This affords clearances of 16 ft. horizontally and 22½ ft. vertically on the lower deck. The floor system of the railroad deck is of the open type, with steel floor beams and stringers, the ties resting directly upon the top flanges of the stringers. The end floor beams, which are of silicon steel, are of sufficient strength to permit the entire dead load of the spans to be supported on jacks placed under them.

The floor system of the highway deck consists of a built-up floor beam at each panel point, two longitudinal lines of I-beams between the trusses, and an I-beam at the outside edge of each sidewalk. The upper chords of the trusses also act as stringers and help carry the concrete deck.

Above the structural steel work of the highway deck the roadway consists of a 7½-in. reinforced concrete slab, with a 2-in. wearing course of bituminous concrete. This roadway, which is 20 ft. in width between curbs, has a 2-in. crown, and is flanked on each side by a 5-ft. clear sidewalk cantilevered out from the trusses. These side-

In this arrangement the front legs of the towers extend to separate shoes on the special length channel piers, and the rear legs of each tower are supported by small transverse trusses which replace the sway frames at the second panel points of the fixed spans adjoining the lift span.



General Drawing of the Lift Span and Supporting Towers

The lift span is balanced by concrete counterweights which operate within the steelwork of the towers. These counterweights have direct connection with the lift span by means of four units of sixteen 2⅛-in. cables, which

pass over four sheaves at the tops of the towers. These sheaves, which have a pitch diameter of 13½ ft. and weigh approximately 26 tons each, carry loads of about 750 tons each.

Following a plan to keep both decks of the bridge free from obstruction by the tower steelwork and the bridge operating mechanisms, the counterweight sheaves are skewed inward toward the rear of the towers so that the cables fall vertically within the towers to connections with the counter-weights, and outside of the towers, in a vertical plane, clear of the bridge decks, to connections with the lift span. The actual connections with the lift span are not with the structural members of the span trusses, but with a special transverse lifting truss provided at each end of the span, to which the cables are secured by sockets and adjustable eye-bolt hitches.

The effect in the condition of balance between the span and counter-weights, caused by the weight of the main cables rolling over the sheaves, is compensated by a special equalizing arrangement, consisting of a rocker bent mounted at the mid-point of the lift span, and held upright by cables extending from the top of the rocker bent to the two towers. At the west tower these cables are fixed while at the east tower they have connections over sheaves with auxiliary counterweights. When the greater portion of the counterweight cables is on the lift span side of the tower sheaves, the upward vertical component of the force exerted by the equalizing arrangement tends to lift the span, and when the bridge is more than half way open and the greater portion of the cables is on the counterweight side of the tower sheaves, the

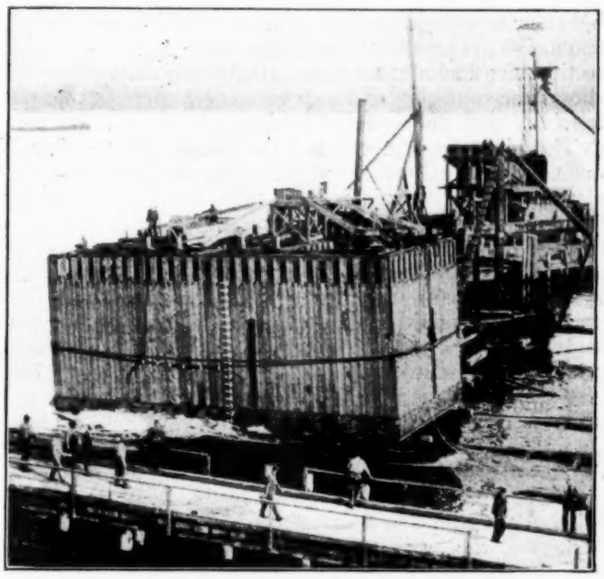
A Near View of the Lift Span and Supporting Towers

action is reversed and the downward vertical component of the force exerted by the equalizing arrangement tends to add to the weight of the span.

Operation of Lift Span

Power for the operation of the lift span is supplied by two 150-hp. electric motors, supplemented by a 95-hp., tractor-type gasoline engine. The span is operated by cables actuated by winding drums which are mounted on brackets outside the trusses and below the sidewalks at the middle panel of the lift span. The main gear train, motors, brakes, switchboard and gasoline engine are mounted inside the machinery house which is located between the trusses, below the highway deck and above the railroad clearance, in the middle panel of the lift span. The machinery house, which is about 25 ft. by 15 ft., has a concrete floor, and timber walls covered with copper outside and asbestos board inside. The middle panel of the highway deck on the lift span has a membrane waterproofing to insure its effectiveness as a roof for the house. The house has a hand-operated four-ton bridge crane inside, and a trolley hoist outside.

Operation of the lift span is controlled entirely by one man from a control house located just above the roadway



Launching One of the Caissons

clearance in the tower at the west end of the span. Within this house, which is more or less similar in construction to the machinery house, there are two floors, each about 25 ft. by 8 ft. The lower floor is occupied entirely as the operator's station and houses all of the controls for the bridge, bridge locks, rail locks, signals, gates, etc., in addition to a railroad signal and interlocking machine, a track model, and various gages and meters. The upper room is occupied almost exclusively by the batteries for the operation of the railroad signals, and by storage space.

Current for the operation of the lift span is delivered at the Bath end of the structure and is carried along the bridge in conduit supported on special brackets just below the sidewalk on the north side. At the center of the bridge the conductors are carried up to a transformer platform at mid-height of the west tower. Power cables to the lift span are carried on the rocker bent cables, then down the rocker bent and into the machinery house. Through this arrangement the conductors are kept taut in all positions of the span while being raised or lowered. Current for power and lighting at the east end of the bridge is carried by aerial cables extending between the tops of the lift span towers.

The span locks provided at each end of the lift span are of the motor-driven, latch-lever type, which lock each truss at each end of the span. These locks consist essentially of two movable links, pivoted at the base, which move forward in vertical planes so that the rollers at their upper ends engage wedge plates mounted on keeper brackets attached to the lift span. Each lock is operated by a five horsepower, high torque motor, mounted immediately between the railroad stringers and connected to

the lock in each case by a special arrangement of gears and shafts. Electric limit switches on each lock stop the motor at the locked and unlocked positions and are so tied into the interlocking system at the bridge that neither lock can be operated in either direction until the span is in the fully closed position and until full protection has been given to highway and railroad traffic. Similarly, when all of the locks are in the closed position no power can be applied to raise the span, and when the locks are open no power can be applied to alter the stop position of the railroad signals and the highway protection devices.

The signal protection of the railroad consists of the usual automatic block system, supplemented by color-light draw bridge signals with smash boards, located about 500 ft. on each side of the draw span. This protection also includes an illuminated track diagram which shows the condition of the tracks for a considerable distance on both sides of the bridge.

The highway protection at the draw span consists of ordinary railroad crossing-type gates, steel roadway barrier gates, and warning signs, bells and lights. In the layout of these protection devices, the barrier gates are located immediately at the rear of the towers on each side of the draw, and the crossing gates are in each case located about 60 ft. further from the lift span. The warning signs and bells are mounted together on one post and have been placed at the curb line about 100 ft. in advance of the crossing gates. The warning lights consist of four lamps with red globes, which are spaced uniformly across each gate.

East Railroad Approach Involved Heavy Grading

While the site selected for the bridge had a number of advantages from the standpoint of both location and construction, the principal disadvantage which it involved was the widely varying elevation of the ground levels on the east and west shores. At the west end, or at Bath, the general ground level was only about three feet above high tide of the river, while at the Woolwich end the ground level ranges from about 30 to 75 ft. above the river, the highest elevations lying about 600 ft. back from the shore. It was to meet this situation that the bridge was constructed on a one per cent grade, and while this reduced the approach work at the east end, the work was still heavy. This was true particularly in the case of the railroad approach which involved approximately 4,300 ft. of new line in which it was necessary to make a rock cut approximately 1,200 ft. long and from 16 to 30 ft. deep.

The railroad approach at the west end of the bridge involved little work as the railroad deck level at this end of the structure was planned at practically the same elevation as the yard and station tracks. The work on this side of the river was also simplified by the fact that a 500-ft. straight approach track alone was necessary to connect the bridge with the main track passing the passenger station.

Highway Approaches Are on Viaducts

The highway approaches to the bridge are in each case supported on viaduct structures, that at the west end being about 427 ft. long, and that at the east end about 597 ft. long. At the Bath end the approach leaves the end truss of the river bridge on a curve of about 500 ft. radius, turning to the north for a distance of about 279 ft. where it joins a tangent section of the approach, which in turn extends to a connection with a rearranged intersection of Front and Vine streets. On the curved section of the approach the 20 ft. normal roadway over the bridge is widened to 22 ft. and is given superelevation of 12 in. The grade of the west end approach is a maximum of 4.9 per cent. The viaduct at this end of the bridge, which consists of seven spans, varying from 40 to 80 ft. in length, has a steel deck with a reinforced concrete roadway slab, supported on twin cylindrical concrete piers which in several instances are joined by reinforced concrete buffer walls.

The highway approach at the east end of the bridge is a steel viaduct consisting of three spans of about 70 ft. and 14 spans of about 35 ft. The 70-ft. spans and one 35-ft. span are plate girder structures with built-up floor beams and I-beam stringers, while all of the other 35-ft. spans consist of I-beam stringers carried by built-up cross girders in the bents. The superstructure of the viaduct is supported on structural steel towers and bents which in turn rest on concrete footings. The east approach swings to the north on a curve of about 700 ft. radius, and rises on an incline of approximately 0.2 per cent to the east, joining a widened roadway, the center of which is occupied by a toll house and parked area. Beyond this section, a new street, 20 ft. wide, extends for about 1200 ft. to a connection with one of the old roads near the town of Woolwich.

Pier Construction Involved Difficulties

Some of the most difficult and interesting work in connection with the Carlton bridge was the construction of the eight river piers, which, with one exception, were put down to rock foundation within pneumatic caissons. The single exception was in the case of the pier nearest the Woolwich shore of the river which was built in an open cofferdam. All of the caissons were of timber and reinforced concrete construction and, with the exception of those for Piers 1 and 7, were floated into place and sunk as far as possible by open dredging. When the limit of open dredging was reached, the caissons were partly unwatered and a concrete deck was poured in each dredge well, making the caissons pneumatic. In the case of Caissons 1 and 7, the overburden of the rock river bottom was so shallow that no attempt was made to remove any of the material by open dredging.

Some of the most interesting caisson work in connection with the bridge piers was encountered at Pier No. 2, from the Bath end, where a new record was established for pneumatic bridge pier construction in America. At this point the caisson was carried down to a depth of 118.7 ft. below mean tide level, and 123 ft. below the surface of the water at high tide.

Aside from the difficulty of working under 50 lb. air pressure, as was necessary in the construction of this pier, and under the high pressures necessary in the caisson work on Piers 3 and 5 which extend to depths of 110 ft. and 114.5 ft. below mean tide level respectively there was the problem of a very irregular shelf rock foundation at each pier site, which in some instances dropped off as much as 10 or 11 ft. within the width of the caissons. There was also the problem of a strong tide in the river, and in the cases of Piers 1 and 2, which were completed during the winter months, some difficulty was encountered with ice.

All of the river piers are of concrete construction throughout, with the exception that each pier has a belt course of granite masonry within the tidal range to preclude damage by ice and the disintegration of the concrete by the brackish water of the river. All of the piers have different cap elevations because of the grade on the bridge, these elevations ranging from 6.04 ft. above mean tide, at the top of Pier No. 1 at the Bath end, to 25.73 ft. at the top of Pier No. 8 at the Woolwich end.

The piers vary in size according to their depths and the loads carried. Thus the two channel piers are 54 ft. long by 25 ft. wide, the west end pier is 37 ft. by 18 ft.,

the east end pier is 34 ft. by 14 ft., and the remaining piers are 40 ft. by 22 ft. In each case the pier substructure extends as a vertical shaft to a point well above the river bottom, and is then surmounted by a shaft with battered faces, and with rounded cut-waters at each end.

Caisson No. 2 Established New Record For Depth

The caisson work on Piers No. 1 and 2 of the bridge was the most difficult, yet it was in many respects typical of all of the caisson work carried out. In the case of Pier No. 1, the river bottom was 34 ft. below mean tide level and the rock at this point had only a light cover. The difficulty encountered here was that the caisson landed with its west side on a rock ledge while the east side was at least 10 ft. above the ledge. As there was but little cover above the ledge there was grave danger of the caisson tipping over. To prevent this, two 12-in. pipes were packed down to the edge on the east side, cleaned out and filled with concrete, and were then made to support the east side of the caisson through an arrangement of blocking. Thus supported against overturning, wood sheeting and steel sheet piling were driven along the bottom of the entire east side of the caisson in order to permit the excavation of the soft material.

Because of the leakage of air in making this excavation, three compressors were put in service to maintain the pressure in the working chamber. This was only partially effective and was objectionable in this particular case owing to the fact that the close proximity of the compressors to the working chamber caused a high temperature in the caisson. In overcoming this difficulty and a large portion of the air leakage, a special cooling system was installed in the air supply, and a rich grout of Luminite cement was forced into the soil back of the sheet piling, and between the piling and the cutting edge of the caisson.

All of the excavation in connection with this pier was done under air pressure, both men and materials passing through one air lock in the top of the air chamber. When the foundation had been cleared of all soft material, heavy steel dowels were driven into the irregular rock ledge to form an anchorage for the pier structure.

When sinking the caisson for Pier No. 2, which reached the greatest depth of any of the caissons, the cutting edge first reached rock 108.2 ft. below mean water level. However, owing to the sloping surface of the rock ledge, certain sections of the opposite cutting edge rested on about 10 ft. of clay above the ledge. With the river bottom at an elevation of minus 37 ft. at this point, open dredging was carried down through sand and clay for a distance of approximately 63 ft., and from then on all of the work was done under air pressure, this pressure reaching a maximum of 50 lb. At the bottom, where the cutting edge did not reach rock, short lengths of steel sheet piling were driven as in the case of Pier No. 1, and sacks filled with concrete were used to wall up the excavated area between the cutting edge and the piling.

The greatest difficulty in placing this pier was the high working pressure required, which made it necessary to relieve the workmen in the working chamber every 50 minutes. In this caisson there were two man locks and two material locks, which greatly expedited the handling of the men and excavated material. The sinking of Pier No. 2 involved the removal of 2,056 cu. yd. of sand and clay by open dredging, and 514 yd. of similar material and 10 yd. of rock under maximum air pressure.

The work in sinking Piers 3, 4, 5, 6 and 7 was in most respects similar to that in connection with Piers No. 1 and 2, although somewhat less difficult as the rock ledge encountered was more nearly level. The principal difference in the work was in connection with the sinking of the channel piers which required caissons 54 ft. by 25 ft. These caissons were built with three working chambers, each having separate man and material locks.

All of the caissons, which were built with heavy timber frames and with heavy steel cutting edges, were constructed above the water level on the river bank, and then launched and towed to their proper locations. A few piles driven at each pier site guided the caissons and held them in position as they were gradually sunk to the river bottom.

All of the concrete used in the construction of the piers was made on concrete scows equipped with batchers, mixers, cranes, buckets, towers and chutes for placing the concrete where desired. The only special concrete work undertaken was the use of Luminite cement for grouting around the bases of the caissons to minimize air leakage; in building the underpinning for caisson No. 1; and in constructing the decks in the dredge wells of the caissons when pneumatic work was begun. In this latter use of Luminite cement, it is estimated that the time of constructing each pier was shortened by about two weeks.

The new bridge at Bath was constructed by the State of Maine under an act of the State Legislature in which the Maine Central agreed to pay 55 per cent of the first cost and operating expenses of the bridge. The bridge derived its name "Carlton" from State Senator F. W. Carlton, chairman of the bridge directors representing the state. All of the engineering work in connection with the bridge was handled by J. A. L. Waddell, consulting engineer, New York, assisted by Shortridge Hardesty, his principal assistant engineer, and C. K. Allen, resident engineer on the work. The superstructure was fabricated and erected by the Pottstown, Pa., plant of the McClintic-Marshall Company, while all of the substructure was constructed by the Foundation Company, New York. The Maine Central's share in the bridge construction included primarily the grading for the track approaches, and all of the track and signal work. This was done under the general supervision of B. T. Wheeler, chief engineer of the Maine Central, and under the direct supervision of A. H. Morrill, engineer of construction.

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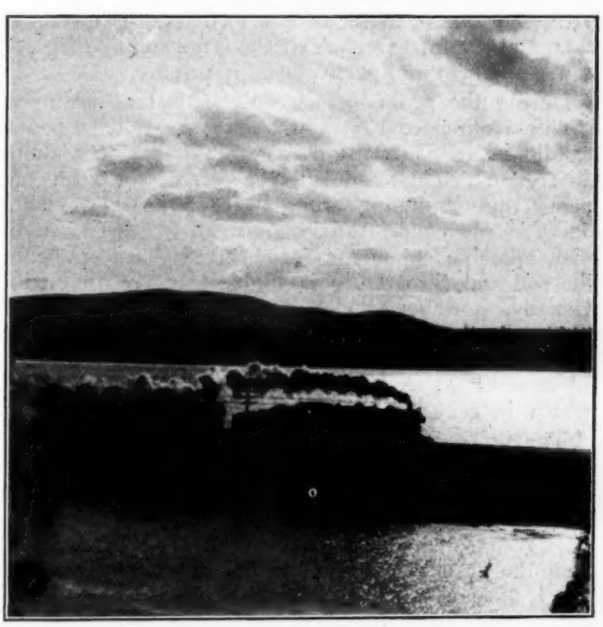
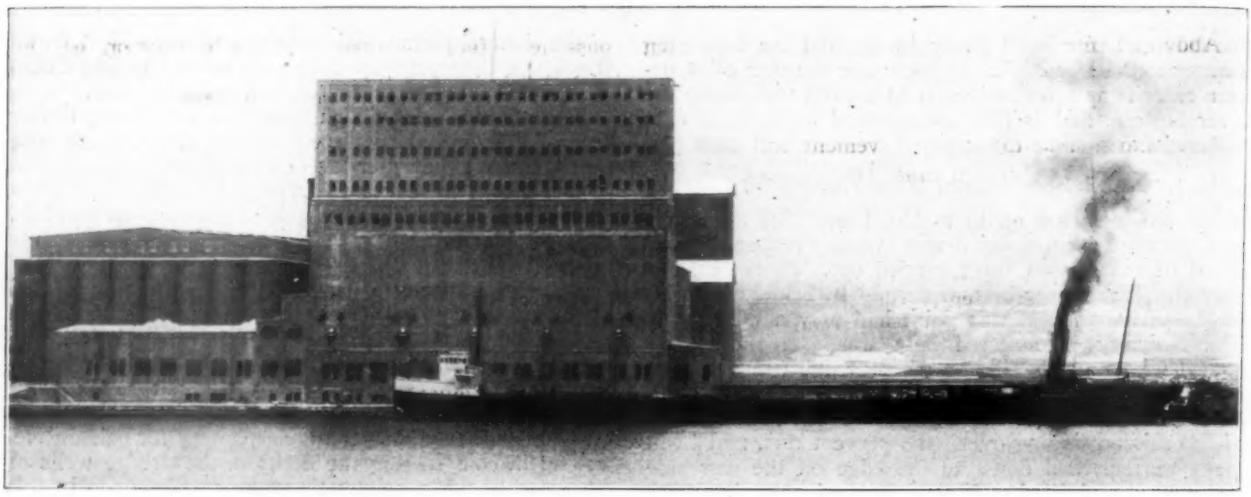


Evening on the Hudson River Division, New York Central



One of the Storage and Trans-Shipment Elevators at the Head of the Lakes

Moving the Canadian Grain Crop

Railways accomplish gigantic task of handling many times their normal traffic during three months

Part I

EACH year, during the grain harvesting season, the Canadian railways serving the prairie provinces are called upon to handle many times their normal traffic. During the 1927 season, 177,985 cars of grain were handled, principally from Western Manitoba, Alberta and Saskatchewan, the so-called prairie provinces. The immensity of the problem encountered is indicated by the fact that, during September, October and November, the principal grain-shipping months, these roads handled 331,845 cars, as compared with the movement of 244,946 cars during the normal months of May, June and July. Among other difficulties this involved the employment of some 6,000 extra men, the transfer of 130 locomotives and 20,000 cars, and the intensive use of the large supply of power and equipment ordinarily held in reserve.

During the grain season, divisions that ordinarily handle from 2 to 10 trains a day are called upon to handle 12 to 35 trains daily. Stations where almost no freight originates during the rest of the year, suddenly begin shipping from 10 to 50 cars of wheat daily. This concentrated movement starts in August with sporadic shipments from certain localities where the soil and climate are favorable to early production. Usually, however, the bulk of the wheat does not begin to move until about September 15, attaining its maximum some time in October and continuing in full force until the close of navigation on the Great Lakes which is generally early in December.

The problems encountered in handling this seasonal rush are unique on American railways, in view of the immensity of the task. The question of an adequate car supply is of paramount importance. Plans must be developed and carried out far in advance of the time the grain is actually ready to move. By September 1, at least, there must be enough cars at stations in the wheat fields to handle 10 days' shipments and the flow of traffic must be watched constantly to see that empty cars are returned speedily from the lake ports to the wheat fields so that they may again be loaded for another trip to the head of the lakes.

All of the divisions affected require many more locomotives than are normally in use. The problem of power supply also presents its difficulties and requires careful planning in advance. In addition to the necessity of having a sufficient number of extra engines on hand, their condition must be such as to insure the greater percentage of them operating intensively for the entire period of the grain rush without backshop attention.

Loading Cars at an Elevator in the Prairie Provinces

Above all, men must be secured, thousands of men for train and engine service, switchmen, car-riders, clerks, telegraph operators, dispatchers and a number of other occupations. The added force must, of necessity, be temporary, since the grain movement only lasts for three months, yet the men must be sufficiently experienced to handle the business at an unusually difficult time, when the equipment and facilities are being taxed to their utmost capacity. The fluctuations in the traffic present another serious problem. The movement of wheat is dependent entirely upon the weather conditions. Heavy rain or snow render harvesting impossible and have a corresponding effect on car loading which makes necessary the constant readjustment of the forces if operating economy is to be secured. Maintaining this huge temporary force is an expensive business at best. The low rates received for the transportation of the grain make economy imperative if the business is to be handled at a profit. The result is that the force must be of such a nature as to permit increasing or decreasing it promptly to correspond with heavy or relatively light traffic.

Migratory labor of a sort is more or less readily available during the wheat season, in the form of woodsmen, harvest hands, and "drifters" from the United States. Experience has taught the Canadian railways, however, that this type of labor is seldom reliable and, as far is possible, the employment of "boomers" is avoided. The roads adopt somewhat different methods of obtaining necessary labor, which are described in detail in the succeeding articles.

Expenditures and Experience

The railways have spent millions of dollars in developing facilities adequate to meet the situation, many of which are unused except during the grain season. Developments in operating methods, brought about by the experience of years, have also resulted in increasing the efficiency with which this traffic is handled, until the entire operation now presents an unusual study in efficiency and skill in meeting a succession of difficult situations.

The Department of the Interior of Canada recently paid the railways a well-merited tribute, in an official publication, which is quoted in part: "The grain trade itself excites wonder, not by its remarkable growth alone. Its transportation calls for a marvel of organization. The volume of wheat to be marketed is immense, the wheat fields are far removed from the seaboard, and the Pacific ports as yet are equipped to handle only a small share of the movement. The great problem is to forward as much of the crop as possible before the winter closes navigation of the Great Lakes-St. Lawrence system of inland waterways. There is nothing more impressive in Canada's commercial life than the precision and smoothness with which the machinery of the grain trade performs its huge task. Railways and other interests work at top speed to receive, clean, grade and forward in constant flow the great stream of grain. The rapidity of the movement is astonishing."

Railway Problems Increasing

The wheat acreage of the prairie provinces has been increasing steadily for years, having more than doubled in the last decade. The annual production has also doubled during the same period, although the increase in production has been somewhat less regular than the grain in acreage, owing to the variations in yield per acre and weather conditions which have affected the crop adversely in some years. The detailed figures are shown in Table 1, by crop years, which extend from August 1 to July 31.

The railways have played a very important part in the development of new wheat acreage. The total railway mileage in the wheat producing provinces at

Diagram Showing Where the Canadian Grain Crop Is Marketed

Table 1. Canadian Wheat Production—Bushels

1909-10	167,000,000
1910-11	132,000,000
1911-12	231,000,000
1912-13	224,000,000
1913-14	232,000,000
1914-15	161,000,000
1915-16	394,000,000
1916-17	263,000,000
1917-18	234,000,000
1918-19	189,000,000
1919-20	193,000,000
1920-21	263,000,000
1921-22	300,000,000
1922-23	400,000,000
1923-24	474,000,000
1924-25	272,000,000
1925-26	411,000,000
1926-27	400,000,000

the present time is 15,354, of which 1,985 miles are main lines and 13,389 miles are secondary main lines or branches. Manitoba has 3,883 miles of railroads in the wheat growing territory west of Winnipeg, Saskatchewan has 7,230 miles and Alberta 4,261 miles. Except for the main line of the Canadian Pacific and some secondary main lines, all of this vast mileage has been built in the present century, the large majority of it since 1910 and, as may be imagined, this construction has played an important part in increasing the grain acreage and production.

The largely increased crop has in turn required the railways to add more facilities and increase their operating efficiency to take care of the greater burden. Another factor which has added to the railways' problem has been the steady movement westward of the wheat producing territory. The farmers of Manitoba, formerly one of the chief wheat producing territories, are turning more and more to general farming and the production of wheat is declining. Conversely, the production of wheat in Saskatchewan and particularly in Alberta has increased tremendously, involving a readjustment of operations and necessitating a longer haul to the lake ports each year. The recent rapid development of Vancouver and to a lesser extent of Prince Rupert as grain ports has also added to the railways' problems, since, while it diverts some of the traffic from the busy lines to the lake ports, it presents additional operating problems in that the tonnage that can be handled westbound over the mountains is materially less per train than can be handled over the relatively flat country to the lake ports. The following table indicates the distance the wheat must be hauled to reach the more important ports, from the centers of the wheat producing territories:

From	To Vancouver	To Fort William	To Montreal
Calgary, Alta.	642	1,267	2,190
Edmonton, Alta.	769	1,253	2,163
Regina, Sask.	1,108	783	1,724
Saskatoon, Sask.	1,095	932	2,367
Winnipeg, Man.	1,465	419	1,412

How the Grain Moves

In the prairie provinces, the main line of the Canadian Pacific takes a southerly route, passing through Winnipeg, Regina, and Calgary, while the main line of the Canadian National, passing through Winnipeg, Saskatoon, and Edmonton, serves more northerly territory. However, there is a veritable network of branches of both lines serving the wheat territory. In general, the C. P. serves the southern part of the provinces and the C. N. the central part, although a considerable portion of the territory is served by both lines.

Only a relatively small percentage of the wheat grown in western Canada is milled in the territory in which it is grown. By far the bulk of the crop is moved by rail to Fort William or Port Arthur. The wheat produced in western Canada is of the so-called "hard" variety, which is quite suitable for export. A large percentage of the total crop is exported to Europe, particularly to the British Isles. The all-water export route is from Fort William through the Welland Canal and down the St. Lawrence waterway to Montreal. While considerable grain moves by this route, much greater amounts are shipped lake and rail, moving down the lake to Georgian Bay ports or Buffalo, then by rail to Montreal or Atlantic seaports. Much of the grain that goes to the Pacific Coast ports is intended for export via the Panama Canal to Europe, although, in the past few years, a growing market for wheat has developed in China and Japan, whose staple grain hitherto has been rice. The accompanying diagram gives a graphic illustration of the normal movement of the crop and represents the total movement during the crop year from August 1, 1926 to August 1, 1927. Table 2 shows the total crop, together with its distribution and a comparison with the previous crop year.

There are some 2,000 shipping stations for wheat on the lines of the railways in the prairie provinces. Some 4,000 or more elevators are situated at the stations. In accordance with the provisions of the Canada Grain Act each of these stations is equipped with loading platforms so that the farmers may load grain directly into the cars without utilizing the service of the elevators. There are some 2,500 such platforms distributed at the various loading stations. The loading platforms are wood structures with ramps leading to platforms level with the car floor, on which wagons may be driven and the grain shoveled directly into the cars.

Table 2. Canada's Wheat Supplies and Exports, 1926-7 Crop*

	1926-27	1925-26
Grain in Storage, August 1	35,601,194	26,482,676
Total Grown during Crop Year	409,811,000	428,416,700
Total Supply	445,412,194	454,899,396
Exports of Wheat and Flour	292,880,996	324,592,021
Domestic Consumption	101,945,510	94,706,181
In Storage, August 1	50,585,688	35,601,194
Exports by Ocean Ports		
Montreal, Que.	83,144,207	91,412,401
Quebec, Que.	4,912,766	3,769,245
Vancouver, B. C.	39,652,931	58,736,871
Prince Rupert, B. C.	5,644,779	.....
St. John, N. B.	21,579,367	15,880,995
Halifax, N. S.	2,972,597	3,225,076
Other Canadian Ports	92,716	67,963
Portland, Me.	7,929,869	6,644,001
Boston, Mass.	4,654,350	4,782,400
New York, N. Y.	77,482,497	91,439,539
Philadelphia, Pa.	17,059,924	17,736,798
Baltimore, Md.	11,962,943	12,577,324
Norfolk and Newport News, Va.	958,962	335,874

* The figures given represent bushels.

Distribution of Empty Cars

The distribution of empty cars for grain loading is governed by the provisions of the Canada Grain Act. It is based upon the principle that in the distribution of such equipment every shipper of grain shall count as one unit regardless of the amount of grain which he has to ship., The agents at all country stations from which grain is shipped keep car record books in which applications for cars are entered in the order in which they are received, and these books are open to the public at all times. Any grain shipper may order a car or cars according to his requirement, specifying the size of the car desired. The cars are awarded applicants according to the order in time in which such orders appear in the order book, without discrimination between the country elevator, loading platform, or otherwise. As each applicant is allotted a car, in good order and condition, he must declare his intention and ability to load the car within the ensuing 24 hours, otherwise his application is cancelled.

If the cars available at the shipping point fail to fill all the orders as entered, the agent begins at the top of the list in his order book and proceeds downward to the last name entered on the list, each applicant receiving a car in that order as quickly as the cars are available. When a shipper has loaded or cancelled a car alloted to him he may, if he requires another car, become eligible therefor by placing his

name and residence at the bottom of the list, and when the second car has been allotted to him and he has loaded or cancelled it, he may again write his name at the bottom of the list as it exists at that time and continue to do so in similar fashion until his requirements have been filled. However no applicant is allowed to have more than one unfilled order on the order book at one time.

During car shortages, the Canadian Grain Board may at its discretion direct the railways to make an equitable distribution of empty grain cars to all shipping points in proportion to the amount of grain ready for shipment. Special distribution of cars is also sometimes arranged for places where the grain is known to be damp and liable to become damaged or to other stations where elevators have heating grain in store or are in danger of collapse.

An elaborate system of grading and inspection of the grain is provided by the government and government inspection stations are situated at Winnipeg, Man., Calgary, Alta., and Moose Jaw, Sask., and Saskatoon. The largest proportion of the grain is inspected at Winnipeg. The inspection is performed by government inspectors in the railroad yards as soon as the cars come in from the country stations in trains and before they have been switched. The inspection is made by pushing a hollow tube containing several compartments, which may be opened and closed at will, into the grain at several places in the car. In this manner some of the grain from practically every section of the car is secured and the grain may be graded accordingly.

Nearly 200,000 Cars of Wheat Yearly Come from the Canadian Wheat Fields

Fort William—Port Arthur Terminal

The large proportion of the grain moving from the prairie provinces is transported to the lake ports of Fort William and Port Arthur to be transhipped to boats at those points. This movement continues throughout the season of navigation and storage grain moves to these ports for some weeks after navigation closes until the capacity of the elevators has been reached. At the beginning of the present grain season this capacity amounted to 187,810,000 bushels but large elevator construction projects are nearing completion at these ports so that the elevator capacity will be materially increased.

The railways have been largely responsible for the development of these ports. The first elevator built at the lake front was erected by the Canadian Pacific in 1883. In the following 20 years five more elevators were built by the same company, in addition to others built by the Canadian Northern and the Grand Trunk Pacific. With the passage of the Canadian Grain Act, however, and for other good reasons, these elevators were turned over to lessees and are now operated as private enterprises. The transshipment of grain from cars to boats is controlled by an organization of the grain trade known as the Lake Shippers' Clearance Association. This organization was formed 15 years ago in order to facilitate the loading of grain into boats and the dispatch of boats from the head of the lakes to the various eastern ports. The captains of the boats arriving at Fort William and Port Arthur report to the association for instructions. The association, acting in the capacity of a dispatcher, allots the boats to the various elevators for loading, and after being loaded, they are cleared under the supervision of the association. The association maintains a close touch with the entire grain trade and particularly with grain firms having grain in elevators at the lake ports. The grain firms and elevator companies file their warehouse receipts with the association and that body then takes care of the remainder of the transaction by seeing that necessary boats are secured to handle the cargo, and this is arranged in an impartial manner.

Under normal conditions, there is no restriction upon the movement of grain into the lake ports, except that the railways reserve the right to deliver grain to any elevator that may receive it in case the elevator to which it is consigned happens to be full. This provision in the bill of lading has had the effect of preventing serious breakdowns of the transportation system, as, under the intensive operation required, any cars that would have to be held awaiting disposition would materially complicate the situation. In view of the relatively limited terminal facilities at Vancouver, however, and the additional handicap of heavy mountain grades requiring smaller train loads in that direction, all grain moving through the port of Vancouver is handled under the permit system. In other words, the railways keep in constant touch with the terminal situation at Vancouver and know at all times the capacity of the various elevators there. If there is room for grain in the elevators at Vancouver, as is

usually the case, shippers desiring to ship through that port are given permits for a certain specified amount. As soon as the elevators are full, however, these permits are no longer issued and no shipments are made until the boats have removed a sufficient quantity of grain from the port elevators to warrant a resumption of shipping to these elevators.

Grain Handling Important

Despite the fact that, because of the low rates, the grain movement itself is not particularly profitable, the prompt and efficient transportation of the grain by the railways is highly important because the wheat fields are the principal source of western Canada's prosperity. Much of the traffic in manufactured products and in any of the commodities used by the farmers, depends, of course, upon large and profitable wheat crops. If the railways were unable to move the wheat promptly and render the utmost in service, the profits of even an unusually large wheat crop would be cut down and the general traffic would suffer accordingly. The rates in effect on wheat are low, as for example 26 cents per 100 lb. from Calgary to Ft. William, a distance of 1,243 miles, or 25 cents from Lethbridge, Alta., to Ft. William, 1,155 miles.

Parts II and III, describing in detail the operating methods used in transporting the grain crop on the Canadian Pacific and the Canadian National respectively, will appear in following issues.

Sub-Committee of Senators to Consider Consolidation

WASHINGTON, D. C.

INSTEAD of holding further occasional hearings on the railway consolidation bill, the Senate committee on interstate commerce on March 3 decided upon the appointment of a sub-committee of three to consider the bill introduced by Chairman Parker of the House committee on interstate and foreign commerce and that introduced by Senator Fess, which represents an earlier stage of progress of the same bill, and the hearings that have already been held on them, in an endeavor to "whip a bill into shape" for consideration by the full committee. Senators Fees, of Ohio; Sackett, of Kentucky; and Smith, of South Carolina, were appointed as the sub-committee and it was left to them to decide whether further hearings will be necessary. Extensive hearings have been held before the House committee, which has been working on the bill in executive session for about two weeks, and less extensive hearings had been held by the Senate committee, at which most of the same witnesses who had appeared before the House committee had testified before or been questioned by a few members of the Senate committee.

The decision to appoint a sub-committee came after Ben B. Cain, vice-president and general counsel of the American Short Line Railroad Association, had testified briefly before the committee, urging the importance of early action on a bill in order to relieve the uncertainty of the existing situation, and Elihu Root, Jr., representing minority stockholders of the Cleveland, Cincinnati, Chicago & St. Louis, had asked for an opportunity to be heard.

Chairman Watson of the committee then said that hearings had been held on railway consolidation bills for years "without getting anywhere" because of the indifference of members of Congress and that he thought the only way to make progress, in view of the large number of other subjects before the committee, would be for a sub-committee to take the bills introduced and endeavor to "whip a bill into shape" in the light of the hearings already held or further hearings if necessary. He said he had thought that railway consolidation would be the first subject to be taken up this session but that the attention of the committee members had been diverted to various investigations. The other members present agreed with the suggestion and Senator Fess suggested that it might be possible to take advantage of some of the work done on the bill by the House committee and that some 20 amendments had been considered by it.

The latter committee has been much more diligent in attendance both at hearings and at executive sessions on the bill, because most of the Representatives are members of but one major committee, while Senators divide their time between various committees.

Mr. Cain told the committee that the short lines are "up in the air and don't know how to proceed"; that applications for important mergers made to the Interstate Commerce Commission under paragraph 2 of section 5 have not made provision for including the connecting short lines, and that, although the commission in the Nickel Plate case laid down the principle that such provision should be made, it has thus far dismissed applications instead of dealing with them in a constructive manner and is "very meticulous."

He said, however, that most of the 167 acquisition applications that have been before the commission have involved short or weak lines and that he thought this indicated a disposition on the part of the big roads to take all the short lines they think they can use to advantage, but that in the cases where combinations of the larger roads are proposed provision has not been made for the short lines, partly because of the question as to which road should take the short lines, and he favored a provision in the bill by which the commission may allocate a short line to a system. He did not think actual compulsion should be exercised but said that if the commission should decide that a certain line should be "allocated" in a particular way and "lay the baby on the door-step," ways could be found "to require the big road to take care of that baby."

Several of the Senators present indicated an interest in legislation to "take care of" the short and weak lines, saying that was one of the primary reasons for the enactment of the Transportation Act, and said they wanted Mr. Cain to point out just wherein the bill is not adequate for the purpose. He said the short lines approve with some few changes the principles of the Parker and Fess bills, and that although they do not include everything they might want he did not think it practicable at this time to get any more. He did, however, favor a more specific declaration of policy in favor of consolidation in the bill so that it might not appear that any backward step was being taken as compared with the provisions of the Transportation Act.

Senator Smith asked if the situation of the short lines could not be relieved by some provision by which the recapture fund could be made more easily accessible to them. Mr. Cain said that that might help the situation but would not cure it, because the recapture fund does not amount to much and if the short lines borrowed from it they would have to pay it back some time.

The House committee,which has been meeting almost daily in executive session since the hearings on the Parker bill were closed, is planning on reporting out a bill by the end of the week or the first part of next.

The Design and Proportion of Locomotive Boilers*

A discussion of the problems pertaining to boiler design to procure greater locomotive capacity

By C. A. Brandt

Chief Engineer, The Superheater Company, New York

THE best measure of railroad operating performance today is condensed in the unit, ton-miles per train-hour. There has been a steady increase in the figures expressed in this unit during the past 30 years. No actual ton-miles-per-train-hour figures have been found for the railroads in Canada, but I recollect that for the railroads in the United States, the gross increase was about 42 per cent from 1906 to 1916. From 1916 to 1925 there was an increase of 57 per cent. No doubt the railroads of Canada have equalled or exceeded this record.

The problem that has confronted locomotive designers toward accomplishing this result has been a very difficult one, for increasing the sustained power of a locomotive by direct methods involves an increase in the physical dimensions and the weight on the drivers. The weight limitation, with few exceptions, is 60,000 to 65,000 lb. per axle. Determined efforts have been made by some of the larger railroad systems in the country to keep the weight below 62,000 lb. per axle, and thus lessen the destructive action of the driving wheel on the track. Our efforts, then, must be directed toward the production of a locomotive which will develop the highest possible power per unit of total weight, or stating it another way, one that will have as small a weight as possible per horsepower developed. Such a locomotive must, of necessity, have a very high thermal and mechanical efficiency.

There is little hope of increasing the weight on the drivers or of reducing the factor of adhesion below that which has been used on recently designed locomotives. The factor of adhesion usually referred to is the weight on the drivers divided by the maximum tractive force. But we are now recognizing that the true factor of adhesion is the weight on the drivers divided by the maximum turning effort, which may be as high as 30 per cent greater than the average. When the cylinder arrangement is such as to give a nearly uniform turning movement, the true factor of adhesion has been reduced to nearly 3½.

In this paper I shall discuss principally the problems of the boiler and superheater, or the steam-producing part of the locomotive. Usually the boiler problems are discussed independently of the balance of the locomotive. This cannot well be done without some reference to the locomotive in general as the engine and the boiler are so closely related, from the standpoint of construction as well as performance, that one part cannot be easily changed without disturbing its relation to the other.

The design of the boiler and superheater will, in the final analysis, determine not only the efficiency at which the steam is produced but also the efficiency and capacity of the locomotive, since the steam consumption of the cylinders depends largely on the superheat and pressure of the steam. Briefly this relation works out as follows.

The mean effective pressure in the cylinders determines the capacity of the locomotive for all speeds if there is a sufficient amount of highly superheated steam available. The higher the superheat and the initial boiler pressure, the higher the mean effective pressure and the more efficient and powerful the locomotive will be. After the steam leaves the boiler, it must pass through the superheater, throttle and steam pipes. This reduces the steam pressure, due to the frictional resistance of the steam passing through these parts, and it is of the utmost importance that this pressure drop be kept at the minimum.

Here is where the superheater presents a difficult problem, as the steam area through the superheater as well as the superheating surface that can be installed is determined by the diameter of the boiler. Then again, the horsepower capacity can be raised by reducing the back pressure on the pistons. As the vacuum in the smokebox creates the draft which determines the amount of coal that can be burned, it is of the greatest

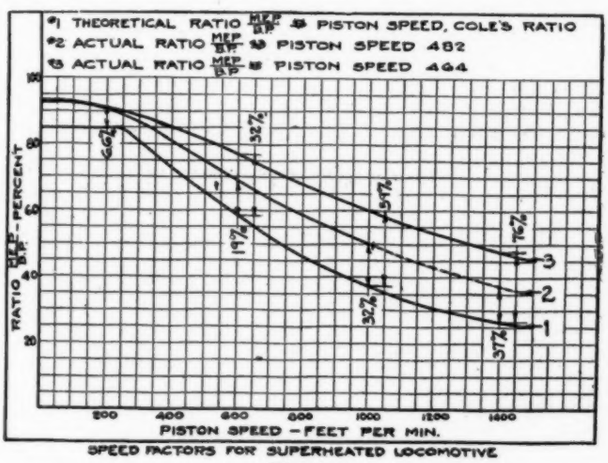


Fig. 1

importance that the draft loss through the flues be reduced to a minimum by increasing the gas area through the boiler. This again is determined by the boiler diameter and the superheater. It is thus seen that the diameter of the boiler has a greater importance than any dimension of the boiler design and the greatest possible diameter of boiler should be used in every case.

Of course, there are other factors that affect the mean effective pressure of the cylinders—particularly the valve gear, which determines the valve travel. The im-

* Abstract of a paper presented before the Canadian Railway Club, Montreal, Que., February 14, 1928.

portance of long valve travel which produces long port openings at short cutoffs and longer exhaust port openings, has long been recognized. Its use has been incorporated in many recently designed locomotives.

Locomotive Ratios

The problems of cylinder and boiler proportion or ratios have been the subject of intense study by many able

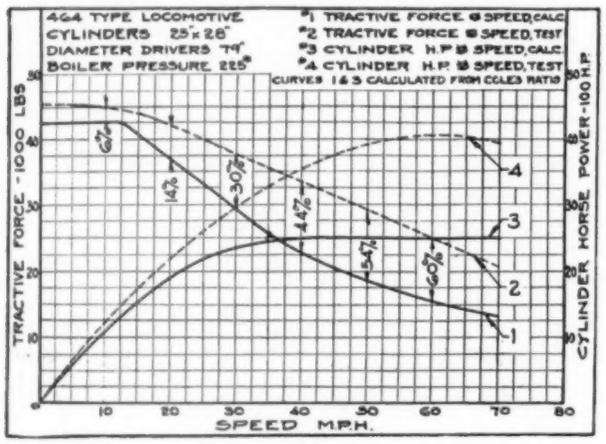


Fig. 2

men, since the first locomotive was built. It would seem to the layman that the laws governing its design should have been all figured out and settled by this time. Such, however, is not the case, and suggestions for improvements are continually being made.

But before we start discussing the design and proportion of the boiler, it is well first to determine what the maximum power is that a given cylinder can develop so we know what to aim at.

Speed Factor

The falling off of tractive force of a locomotive as the speed increases is caused by a reduction of the ratio between the mean effective pressure in the cylinders and the boiler pressure. This ratio plotted against piston speed is used to calculate the tractive force at various speeds and is usually termed "speed factor". This factor has been universally used in determining the tractive force and the maximum cylinder horsepower, which was determined some years ago by F. J. Cole, and is plotted as curve No. 1 in Fig. 1.

Developments of the most recent locomotives, however, have shown that it is possible by the use of high superheat and correct proportioning of the boilers and cylinders to raise this ratio considerably. On the same figure have been shown curves No. 2 and No. 3 which illustrate this ratio of speed factor obtained on carefully conducted tests on two recently constructed locomotives.

It will be noticed that a remarkable improvement has been made on these and other similar locomotives and these curves present the best picture that can be painted to illustrate the improvements in locomotive design of today. The speed factor shown in curve No. 2 can safely be used for freight locomotives with wheel diameters up to 70 in. and curve No. 3 for high speed passenger locomotives when a Type E superheater and a feedwater heater is used.

With the above suggestion for determining the maximum tractive force for starting and at speeds, we can now calculate the maximum cylinder horsepower that can be developed with a locomotive using highly superheated steam.

Steam Consumption

The next step is steam consumption per indicated horsepower. In the calculations for the steam demand of a superheated locomotive, a figure of 20.8 lb. per horsepower-hour has been used universally. This was also proposed and used by Mr. Cole and was based on steam around 200 lb. pressure and 200 deg. superheat.

Since the introduction and use of 300 deg. or more of superheat obtained with the Type E superheater, coupled with a somewhat higher pressure and better steam distribution in the cylinders, this steam rate has been materially reduced.

Numerous tests have been made showing a steam rate as low as 15 to 16 lb. per indicated horsepower-hour at maximum capacity. It is, therefore, suggested that when a locomotive is designed to use steam superheated to 300 deg. F., a pressure of from 225 to 275 lb., a feedwater heater and large grates, a steam rate of 17½ lb. per indicated horsepower including auxiliaries, can be safely used.

General Boiler Design

With these important points in mind, we now come to the question of the design of the boiler, superheater, feedwater heater, etc. Experience shows that some locomotives are better steamers than others and some are not very good. It is evident, therefore, that there are some features in the design of a poor boiler that impose a limit on the development of higher power or reduce the efficiency as compared with others. Our efforts should, therefore, be directed toward finding out where the weak link is in a particular design and discover the ratios or proportions that would show improvement.

My first intention was to discuss the high pressure water tube firebox boiler only, this being the problem that is today most intensely studied. By high pressure is meant boilers carrying upwards of 300 lb. pressure. When reviewing the accomplishments, however, that have been made in the design of the most recently constructed standard type of locomotive having a Type E superheater and a feedwater heater with a pressure around 225 to 250 lb., it appeared that the most valuable

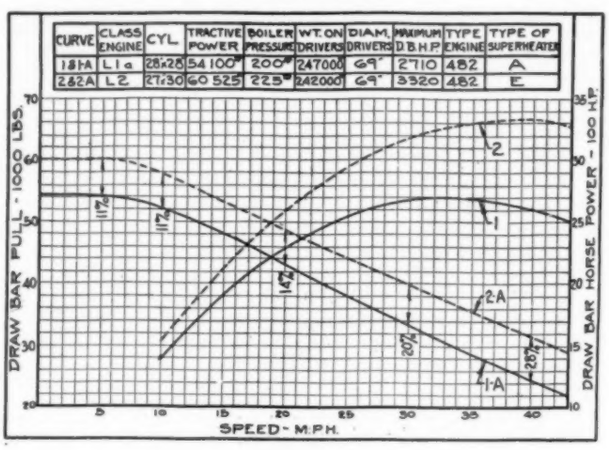

CURVE | CLASS ENGINE | CYL. | TRACTIVE POWER | BOILER PRESSURE | WT. ON DRIVERS | DIAM. DRIVERS | MAXIMUM D.B.H.P. | TYPE ENGINE | TYPE OF SUPERHEATER
1&1A | L1a | 28x28 | 54100# | 200# | 247000 | 69" | 2710 | 482 | A
2&2A | L2 | 27x30 | 60525 | 225# | 242000 | 69" | 3320 | 482 | E
DRAW BAR PULL - 1000 LBS.
DRAW BAR HORSE POWER - 100 H.P.
SPEED - M.P.H.
11%
14%
20%
28%
1
1-A
2
2A

Fig. 3

contribution I could make at this time was to analyze the reasons for the remarkable improvements made in the last ten years, using the conventional designs.

There has recently been placed in service a 4-6-4 passenger locomotive that has developed 4,295 i. hp. with a weight on the drivers of 42.3 lb. per i. hp., and a total

weight per engine of 80 lb. per i. hp. when pulling a train of 26 steel passenger coaches at 67 m.p.h. When you find that this has been done with a boiler and superheater efficiency of 78.6 per cent, an average steam consumption of 17.14 lb. per hp.-hr. and a coal consumption of 2.09 per i. hp.-hr., including all auxiliaries, then you must sit up and take notice. These figures are average results of many tests, and the best average results on any single run with this train were an average boiler and superheater efficiency of 84.2 per cent, a steam consumption per i. hp.-hr., 15.04 lb. and 1.89 lb. of coal fired per i. hp.-hr. This included all auxiliaries. The coal per drawbar hp.-hr. was 2.68 lb. and the maximum temperature of steam was 750 deg. F.

Fig. 2 shows the comparison between tractive force and cylinder horsepower calculated from Cole's formula and the tractive force and power actually obtained from test.

A recent large freight locomotive of the 4-12-2 type has developed a maximum of 4,917 i. hp. with a weight on the drivers of 72.3 lb. per i. hp. and total weight of 101 lb. per i. hp. This is very remarkable for a heavy freight locomotive and represents, as far as I know, the heaviest power output recorded.

Another locomotive of the 4-8-2 type having a total engine weight of 95.8 lb. per i. hp. pulled a freight train of 122 cars of 9,315 tons at a maximum speed of 34.8 m.p.h. and an average speed of 18.25 m.p.h. with a coal consumption of 2.59 lb. per drawbar hp.-hr., including all auxiliaries. This performance was equalled by another locomotive of the 2-8-4 type hauling 9,324 tons at 18.3 m.p.h. average speed on 2.50 lb. of coal, per i. hp.-hr. The drawbar pull-speed for this 4-8-2 type is shown in Fig. 3.

There have been several reciprocating steam locomotives built in the last few years carrying over 300 lb. boiler pressure. All are constructed with water tube fireboxes and compound cylinders as follows: One with 350 lb. and one with 400 lb. boiler pressure by the Delaware & Hudson, the Baldwin No. 60,000 with 350 lb. pressure, and the Schmidt-Henschel locomotive carrying 880 lb. and 200 lb. The performance of the D. & H. locomotive is not known, but that of the Baldwin

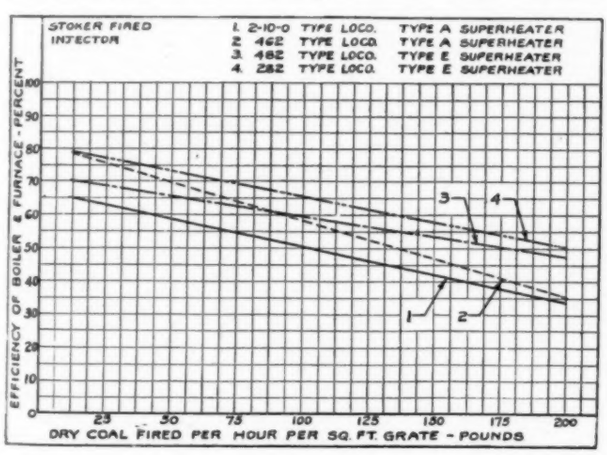

STOKER FIRED
INJECTOR
1. 2-10-0 TYPE LOCO. TYPE A SUPERHEATER
2. 462 TYPE LOCO. TYPE A SUPERHEATER
3. 482 TYPE LOCO. TYPE E SUPERHEATER
4. 282 TYPE LOCO. TYPE E SUPERHEATER
EFFICIENCY OF BOILER & FURNACE - PERCENT
DRY COAL FIRED PER HOUR PER SQ. FT. GRATE - POUNDS

Fig. 4

No. 60,000 was published in the March 26, 1927 issue of the *Railway Age*.

The increase in the theoretical thermal efficiency by the use of high pressure is well known to all students of this subject. Lawford Fry, metallurgical engineer, Standard Steel Works Company, pointed out in a recent paper that the theoretical thermal efficiency of the locomotive cycle will increase from 14.2 per cent at 220 lb. to 17.9 per cent at 450 lb. and 20.7 per cent at 600 lb. absolute pressure.

To obtain the benefit of high pressure, it is clear that a high ratio of expansion must be used by compounding, and the three-cylinder arrangement makes this quite simple and practical. When we consider the remark-

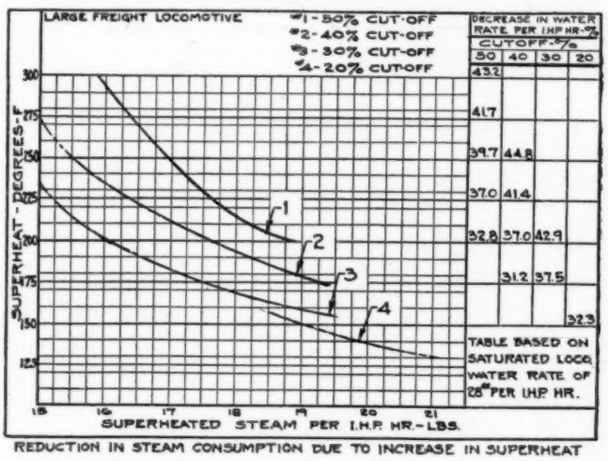


Fig. 5

able efficiency now obtained with a 225-lb. pressure locomotive with a Type E superheater and a feedwater heater, it seems that in order to get a return on the investment and maintenance cost of water tube fireboxes and compound cylinders, a seam consumption of from 10 to 12 lb. of steam per i. hp.-hr. should be obtained and a coal consumption well below two pounds per drawbar hp.-hr.

The Water Tube Firebox

It was a courageous step when the steam pressure for the staybolt boiler was jumped from 200 to 250 lb. Thousands of these are now operating successfully. Recently 265 lb., 275 lb. and 300 lb. boiler pressures have been used on a few locomotives. Whether a 300-lb. staybolt boiler will prove satisfactory, only experience will tell. The general opinion among the best authorities now is that above 250 lb. or 275 lb. pressure, a water tube firebox is the safest and most desirable.

The water tube firebox is an old design. It was first designed 30 years ago by the eminent Russian engineer, J. Brotan. Several locomotives were built in 1904. C. Noltein reported on these locomotives to the International Railway Congress in 1910 as being satisfactory.

The reason why the Brotan boiler has not been placed in general use throughout the world is probably due to the great difficulties experienced and the time required to keep the water tubes free from scale. Where good feedwater is available, we know from the experience of the New York, New Haven & Hartford and the Delaware & Hudson, that a water tube firebox can be satisfactorily maintained.

Unfortunately there are only a few places in the world where pure water for locomotive use is available. In localities of bad or even normal water conditions, the loss of time and cost of keeping the water tubes clean might be very high. It appears, therefore, logical that the only water tube firebox that can be satisfactorily used is one where only pure, or preferably, distilled water is used in the water tube end of the boiler.

This paramount requisite for successful operation of the water tube firebox is incorporated in the principle used by the Schmidt-Henschel locomotive referred to, where the steam used by the cylinders is evaporated by means of indirect heat and then condensed in heat interchange coils located in the steam drums, the condensate returning to the bottom of the firebox headers, thus forming a closed cycle.

While this design was particularly evolved for a high pressure locomotive, this form of construction may prove of advantage with lower pressures as well. It would seem, however, that the many apparent advantages of a water tube firebox will be developed into a practical construction supplanting the staybolt type of firebox.

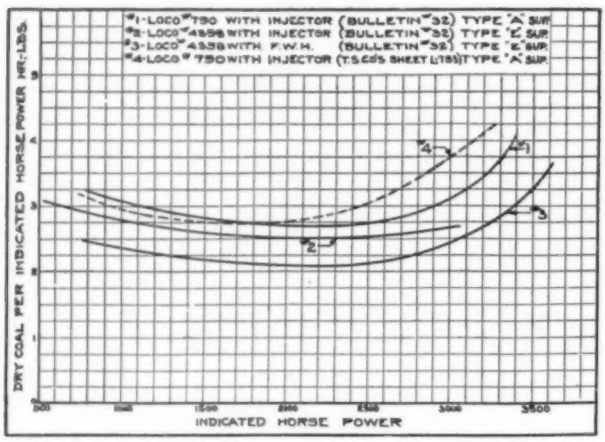

#1-LOCO #730 WITH INJECTOR (BULLETIN #32) TYPE 'A' SUP.
#2-LOCO #4358 WITH INJECTOR (BULLETIN #32) TYPE 'E' SUP.
#3-LOCO #4358 WITH F.W.H. (BULLETIN #32) TYPE 'E' SUP.
#4-LOCO #730 WITH INJECTOR (T.S.C.O.'S SHEET L-188) TYPE 'A' SUP.
DRY COAL PER INDICATED HORSE POWER HR.-LBS.
INDICATED HORSE POWER

Fig. 6

Boiler Ratios

The standard of excellence in design should be the locomotive that has given the highest power output per unit of total weight, the weight of the drivers and per 1,000 lb. of theoretical tractive force. These ratios will give you an accurate picture not only of the excellence of the general proportions and over-all efficiency, but also of the refinement in the mechanical design. Only locomotives in approximately the same class of service should be directly compared with each other.

It is to be regretted that actual dynamometer tests are not available for all of these modern locomotives, but it is known that the performance of the others shown has been excellent and probably equalled those for which tests have been published.

It is evident that it is impractical to lay down a definite rule or ratio that would fit any given condition. All rules and ratios must be used with great care and analyzed in the light of actual conditions to be met. There are certain fundamentals, however, that must not be lost sight of and it is the intention to present and tabulate here the facts available to aid in properly designing a locomotive boiler with as little theoretical speculation as possible and at the same time, give assurance that the best possible locomotive will result.

Boiler Efficiency

When the performance of a locomotive boiler is analyzed, one immediately notices that the efficiency decreases rapidly as the rate of firing increases, or from about 75 to 80 per cent with a coal rate below 40 lb. of coal per square foot of grate per hour to about 40 to 45 per cent efficiency with a coal rate of around 200 lb. per sq. ft.

A number of curves are plotted in Fig. 44, showing the boiler efficiency vs. the rate of firing. It will be noticed that some curves are considerably higher than others while other curves show a different slope. It is thus clear that there must be some factors entering into the proportion of the boilers that have a great influence upon the efficiency for any given rate of firing, as well as upon the rate of decrease as the rate of firing increases. The principal factors that are responsible for the great heat loss, as the output increases, are as follows:

First—Imperfect combustion producing carbon monoxide
Second—External radiation from the boiler and firebox
Third—Loss of heat in the smokebox gases
Fourth—Unburned fuel escaping from the boiler. This heat loss increases very rapidly on the older type of boiler as the rate of firing increases. Numerous tests have shown that this heat loss will run from 15 to 20 per cent at a 60-lb. coal rate, up to as high as 50 per cent when the coal rate is 200 lb. per sq. ft.

This is due to the fact that the grate area and furnace volume are too small to give the carbon and volatile combustible time to to mix intimately with the oxygen and burn before they enter the flues and is also due to the small gas area through the boiler, which causes too high a gas velocity and draft loss through the flues. It is clear, therefore, that a great gain in boiler efficiency will result from any effort that will improve these conditions.

The Superheater

The importance of high sustained superheat has been proved so many times by numerous tests throughout the world that it is accepted among engineers as is the law of gravitation. The fact, however, that cylinder efficiency increases as the temperature of the steam increases, even beyond those that have been common practice, is not quite as well understood. The effect of increased superheat or steam consumption is shown clearly by the various curves in Fig. 5

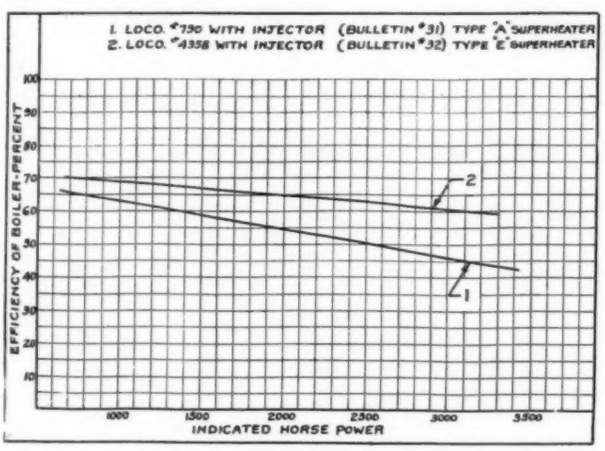

1. LOCO. #730 WITH INJECTOR (BULLETIN #31) TYPE 'A' SUPERHEATER
2. LOCO. #4358 WITH INJECTOR (BULLETIN #32) TYPE 'E' SUPERHEATER
EFFICIENCY OF BOILER-PERCENT
INDICATED HORSE POWER

Fig. 7

These curves were taken from tests and illustrate the fact that superheat follows the law of increasing return. The production of high superheat on the modern locomotive, however, has been made more and more difficult, due to radical changes in the boiler proportions of very large power. It has become necessary for the superheater designer to meet this condition by enlarging the capacity of the superheater. This has been done by increasing the superheating surface. The necessity of this is evident from the fact that less heat is left in the gases entering the flues, due to the greater

heat absorption in the large fireboxes, which decreases the heat available for superheating. The use of feedwater heaters and exhaust steam injectors also, by reclaiming heat that would otherwise be lost, reduces the rate of firing that is required for the same evaporation and naturally decreases the amount of heat offered to the superheater flues.

On the extremely large locomotives of today, the steam space in the boiler has been substantially decreased. The steam liberating surface, has also decreased in proportion to the total amount of water delivered by the boiler. Both of these conditions have contributed to a marked increase in the amount of water that is carried by the steam from the boiler to the superheater. As the evaporation of one per cent of moisture requires as much heat as a superheat of 17 deg., it is a difficult task to provide an adequate superheater as steam may carry five per cent, or more, of moisture when it enters the superheater units. This condition not only points to the necessity for a greater capacity superheater, but to the importance of proper handling of the water level on the road.

The increased demand for operating trains at higher speeds, requiring more steam for a given size of locomotive, requires superheaters of greater capacity, in order that these demands on the boiler may be met without a too serious sacrifice of boiler efficiency and evaporating capacity. The greatest possible total steam area through the superheater is also very important as it will result in less pressure drop through the superheater units. The result of this condition led to the development of a somewhat different arrangement of the superheater unit in a design usually referred to as the Type E.

Results Obtained With the Superheater

The characteristics of the Type E superheater have given satisfactory results in service tests. Fig. 6 shows the results of tests conducted during 1923 and 1924 on the I-1s class, 2-10-0 type engine of the Pennsylvania. Curve 1 on Fig. 6 shows the performance of one of these locomotives having a Type A superheater, while Curve 2 shows the performance of one on an identical locomotive equipped with a Type E superheater. It will be noted that the fuel economy is pronounced through the entire range of power developed on the test.

Fig. 7 indicates the boiler efficiency obtainable by the Type E superheater on the same locomotives from which the data shown in Fig. 7 was obtained. Curve 1 in Fig. 7 is the boiler efficiency of a locomotive with a Type A superheater and Curve 2 of the same class of locomotive with a Type E superheater. Both were for tests in which the live steam injector was used.

In the above references to test results and from the figures and curves shown, it will be clear that it is possible with a Type E superheater to increase the sustained capacity at high speeds by at least 20 to 25 per cent over that obtainable with a properly designed Type A superheater. For large locomotives this is also possible without increasing the weight of the locomotive to a great extent wherever the boiler is properly proportioned for the Type E superheater. Where the axle loads on any railroad have reached the permissible limits and it is necessary to have a still more powerful locomotive, the necessity for and the advantages of a Type E superheater are clearly indicated. Most of the recently constructed high capacity locomotives are equipped with the Type E superheater and there are now about 1,500 installed.

Feedwater Heating

Before closing this paper it could not be considered complete without some reference to the part played by the principle of preheating boiler feed water with waste exhaust steam. No locomotive can be considered efficient without being equipped with some means of doing this. The reasons, therefore, are well known, but will be summarized briefly:

1—It increases the maximum evaporative capacity from 15 to 20 per cent on any boiler, no matter how efficient it be in itself.

2—It decreases the weight of the boiler from 12 to 14 per cent for equal capacities.

3—The first cost, or capital investment, is not any greater for a boiler with a feedwater heater than for a boiler without one and having the same capacity.

4—It increases the cylinder horsepower due to lower back pressure on the locomotive.

5—It increases the capacity of the tender by 20 per cent.

6—It decreases the cost of boiler maintenance, because from 15 to 20 per cent of the feed water is returned in the form of condensed steam or distilled water. It also reduces the expansion strains of the boiler, provided that the feedwater heater is so designed that cold water cannot be pumped into the boiler at any time.

7—It increases the combined efficiency of the boiler and feedwater heater by at least 15 per cent net as it recaptures this amount of heat from the waste steam exhausted from the cylinders.

8—It reduces the total net weight of the engine and tender.

Less Eggs are Damaged Through Use of Cup Flats

THE decided advantage of cup flats over the ordinary strawboard flats and excelsior pads in the shipment of cases of eggs is demonstrated in inspections made by the Western Weighing and Inspection Bureau at Chicago and by the Trunk Lines Freight Inspection Bureau at New York recently. When the ordinary flats and excelsior pads were used the damage varied between 3.5 per cent and 4.5 per cent, but when cup flats and excelsior pads were used the percentage was reduced to between 0.9 per cent and 1.4 per cent. In other words, 52 per cent of the cases involved were packed with a plain flat and 4 or 6 pads per case, and 48 per cent were packed with the cup flat while the former class contributed 80 per cent of the total damage and the latter only 20 per cent.

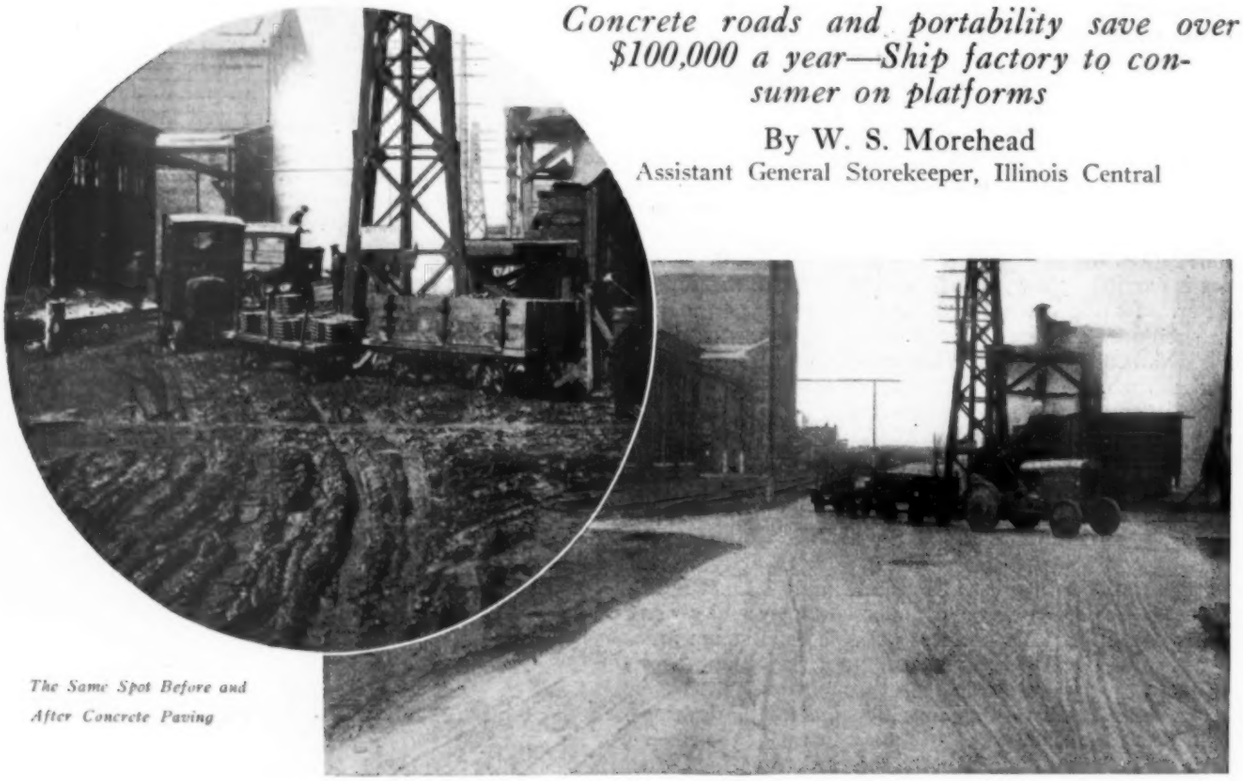
A total of 15,403 cars or 6,281,705 cases were involved. Those packed with 6 pads and ordinary flats totaled 2,054 cars or 819,492 cases, while the damage amounted to 28,431 cases or 3.5 per cent. Those packed with 4 pads and ordinary flats totaled 6,013 cars or 2,337,492 cases, with damage to 105,137 cases or 4.5 per cent. Those packed with 4 pads and cup flats totaled 3,005 cars or 1,227,292 cases, but damage occurred to only 17,244 cases or 1.4 per cent. Those in which cup flats alone were used totaled 4,331 cars or 1,897,427 cases, with damage to 16,887 cases or 0.9 per cent.

Further evidence is found in an incident at Chicago involving 1,343 cars containing 543,771 cases, packed with 8 cup flats and 4 excelsior pads per case where only 2,376 cases or 0.4 per cent were damaged. Again, a total of 1,911 cars or 373,965 cases packed with 14 cup flats resulted in damage to only 2,854 cases or 0.8 per cent. At New York 1,894 cars packed with 14 or 16 cup flats checked out with damage to only 1 per cent of the 873,138 cases in those cars.

I. C. Improves Material Handling

Concrete roads and portability save over $100,000 a year—Ship factory to consumer on platforms

By W. S. Morehead
Assistant General Storekeeper, Illinois Central



The Same Spot Before and After Concrete Paving

AT the Burnside plant of the Illinois Central in Chicago where the general store and the principal shop of the railroad are located, a study has been made of material handling methods and costs since 1920, following the return of the railroads to their owners by the government, which indicate that the company has saved over $100,000 a year in payrolls and effected various other economies.

In 1920 the Burnside paint was well supplied with such material-handling devices as transfer cars, push cars, warehouse trucks, four-wheel push trucks, baggage trucks, wheelbarrows and barrel and box trucks. It is doubtful if another railroad layout in the country had a better equipment of push cars and material tracks. An average of 31 cars of material, exclusive of scrap, is unloaded and loaded at the general store daily, of which 90 per cent is in box cars. This comprises an aggregate of 1,080 tons of material. In addition an average of 102 tons of material is delivered to the local shops each day. To unload, load, distribute and store this volume of material by means of transfer cars, warehouse trucks, push trucks and push cars required a large number of men, and operations were slowed down by delays at elevators resulting from men passing each other in narrow aisles, also in side-tracking push cars on single tracks and in getting push cars over turntables.

A general plan was developed for the installation of concrete roadways, retiring material tracks, re-arranging store facilities and purchasing necessary equipment before any changes or expenditures were actually made. Also before reaching a decision as to the advisability of any change, counsel was taken of all departments likely to be affected by the plan and careful estimates were made of the cost and saving to be effected.

Operations Speeded 50 Per Cent

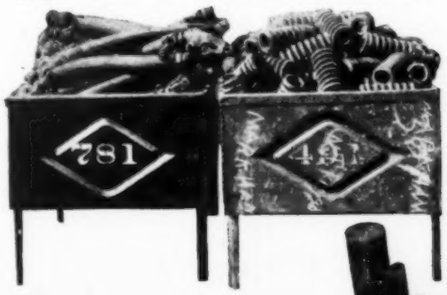
The first step was the purchase of auto trucks to replace the supply train for distributing materials in the Chicago terminal and for collecting material quickly from local railway supply houses in emergencies. Tractors and trailers were also purchased, principally to distribute material from cars to yards and to outlying buildings. These replaced transfer cars and

Brake Shoes Are Among the Stocks Kept on Skids to Reduce Handling

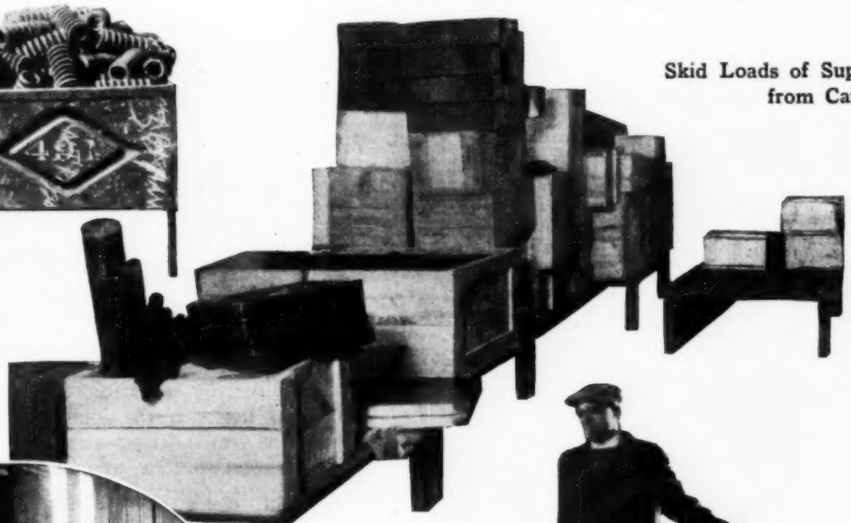
push cars, and saved the two handlings into transfer cars and also the switching of these cars. A further saving arose from the elimination of delays in oper-

ating push cars over single tracks and over turntables and in speeding up the operations approximately 50 per cent.

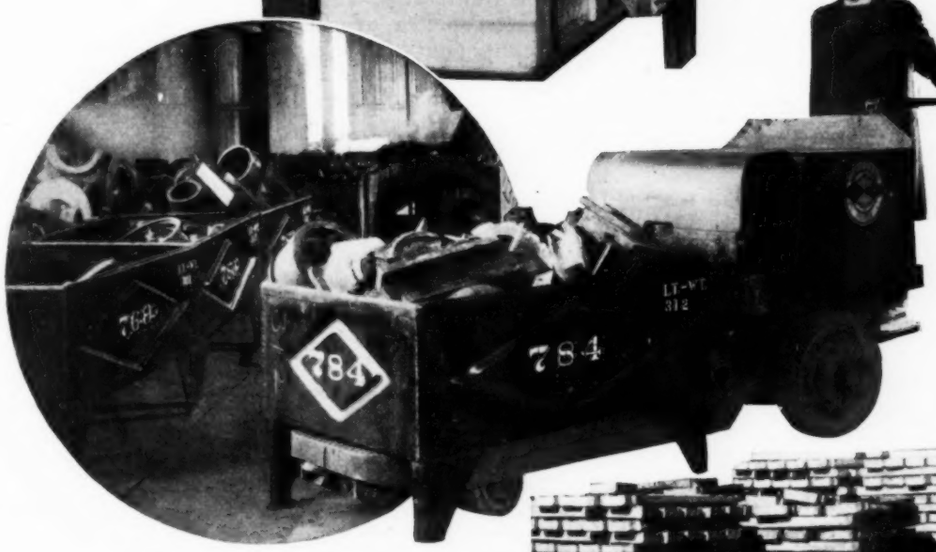
While tractors and trailers proved to be great labor and time savers for the class of work for which they were suited, there still was the need of making some provision for handling material in and out of box cars, to and from the storehouse and to and from congested shops. Electric crane trucks and electric lift trucks with skids were adopted for this work. They dispensed with push trucks, warehouse trucks, baggage trucks and wheelbarrows and with them the labor required to operate these trucks. This equipment was purchased and put into use gradually.



Scrap Shipped to Headquarters in Skids



Skid Loads of Supplies Direct from Cars



Skid Loads of Brass En Route to Factory

Skids Loaded with Material Made in Shops and Awaiting Shipment

All Handling Centralized

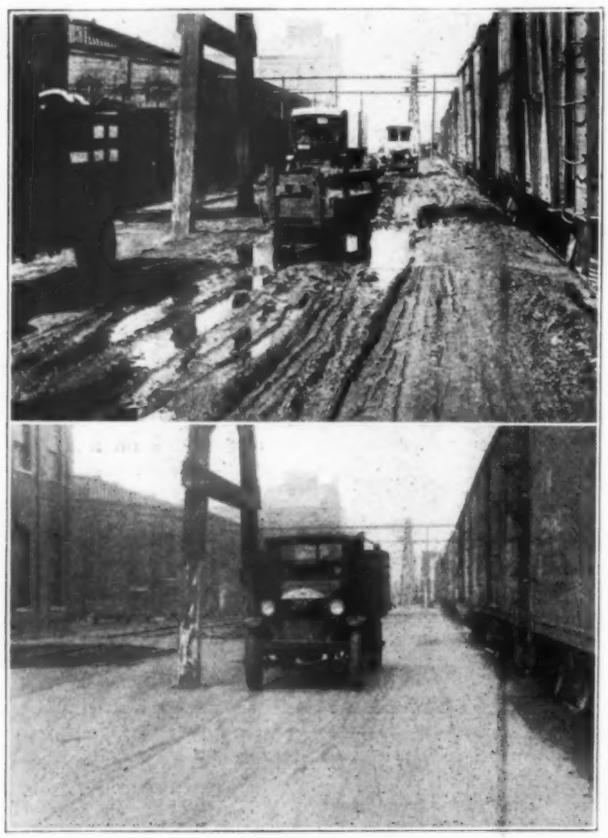
There were numerous obstacles to overcome in making the changes at a busy store and shop such as Burnside, but many of them have been met and removed. Since practically all of the store buildings are at car door level, runways and ramps were built to use motor equipment with trailers effectively. It was also necessary to change aisle arrangements in the store buildings.

As plans progressed, the need of a centralized control of all motor equipment to get maximum efficiency from each machine became evident. A separate department of transport was erected with a man of stores experience in charge as delivery supervisor. Early in 1926, a committee composed of representatives of the operating, mechanical, accounting and supply departments began a study of store and intra-shop deliveries of material. This committee unanimously favored installing this delivery service at Burnside, and this work and all equipment to handle it were placed under the direct charge of the delivery supervisor. As now organized, this man has charge of store and intra-shop delivery, all motor transport in the Burnside plant, both mechanical and store, and all company motor trucks operating out of the plant. This equipment at present consists of:

2	Three and one-half-ton motor trucks		
2	One and one-half-ton motor trucks		
1	One-ton motor truck	3	Electric lift trucks
1	Service car	6	Two-wheel hand carts
7	Gasoline tractors	95	Two-ton shop trailers
2	Electric tractors	2	Three-ton street trailers
2	Electric crane trucks	400	Box skids
1	Gasoline crane truck	450	Flat skids

Only the men operating this equipment report to the delivery supervisor. The various departments load and unload trailers and skids, with the exception of light articles that can be unloaded by truck operators without delay to motor equipment. Following is the work performed by the transport departments:

Handles all shipments of company l.c.l. materials and supplies for the Chicago terminal, which has a main track mileage of 230 miles and a side track mileage of 372 miles.
Delivers commissary supplies to diners.
Unloads and distributes all materials received at Burnside in cars except scrap and other material received in open cars, which are handled by bridge and locomotive cranes.
Assembles all materials for shipment from Burnside, except such as is loaded in open cars by bridge and locomotive cranes.
Transports all items between store and shop and all heavy items from shop to shop.



Another Stretch of Road Before and After Paving—Similar Weather

Material unloaded from open cars is usually handled by bridge cranes or by locomotive cranes. When it is not to be stored under the craneway it is placed on trailers or skids for movement to the point of storage. Material to be shipped in open cars, but which is not stored under the craneway, is also assembled under the craneway for loading by means of tractors and trailers, lift trucks and skids.

Material Stored on Skids

Material taken from box cars for storage in substores or yards at a distance from the main store, is loaded on trailers while other material from box cars is first placed on skids and the loaded skids removed from the car by electric lift trucks. One checker and two men usually comprise the crew for each car. Before the receiving foreman starts unloading a car he first ascertains from the various stockkeepers if there is any material in the car for which they hold orders to load out immediately, and a list of such material is given him by shipping points. The unloading force then places the material called for in these lists on skids and marks the destination on each loaded skid. When these skids are removed from the car, they are either placed direct in a car for the destination shown, are delivered direct to the shop, or are placed in the storehouse at a location set aside for skids in transit, awaiting the day when a car will be loaded for that destination. Any material in the car, for which no orders are held, is placed on skids and the skids delivered to the proper section in the storehouse for storing. Moreover, this material is left on the skids in many cases in order to save the expense of unloading them, the rule being to allow this to be done where materials, such as brake shoes, journal bearings, etc., ordinarily move out in quantities equal to a skid load. The effect is thus to keep live moving material on wheels. In placing loaded skids in a car it is often found advantageous to allow the material to remain on the skid and thus save labor in loading and in unloading at destination.

Special Construction Facilitates Handling

In delivering materials to the shops and in handling material between the shops, tractors and trailers are used for transporting such items as wood for firing locomotives, lumber to and from the mill, arch brick, flues, sheets, pipe cylinders or any items handled from a distance, while electric lift trucks and skids are employed where the distance is short or where congestion prevails. Electric and gasoline crane trucks are used for delivering wheels and other heavy materials to the car yards, while motorcycles with side cars deliver light material to these points where speed is required and two-wheel push carts deliver light materials to the shop.

Two types of skids are used,—a box skid and a flat skid. Both are made sufficiently strong to stand up in shipping; both are built to fit compactly in cars, and both are designed for four-way operations, whereby the lift trucks can raise the skids from either side as well as from the ends. This often proves of advantage in placing or removing skids from cars or trucks and in placing them in congested places in a shop or storehouse. The box type, which is of all-steel construction, is used for assembling the smaller items and for handling materials manufactured in the shops for the stores. This type is also used exclusively in handling scrap and new brass to and from foundries. The flat type is used for the more bulky items and for unloading cars and storage. In shipping material on flat skids, steel tape is used to tie the loading place.

To facilitate the handling of skids from cars at outside stores where there is not sufficient of this work to warrant the purchase of an electric lift truck, a hand lift truck built to handle the standard skids is furnished. These hand lift trucks are also used to advantage at the general store and in the shop in shifting skids in the process of loading or unloading.

Receive Supplies from Dealers on Skids

The extent to which lift trucks and skids can be employed varies with the commodity to be handled, but some operations are handled completely by lift trucks

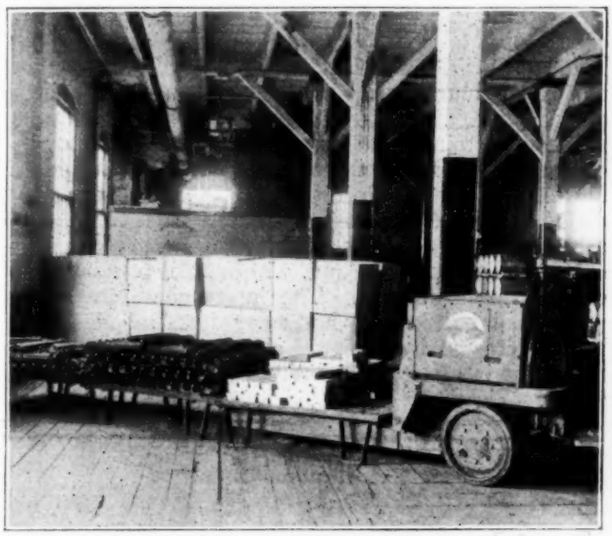
and skids. For example, the Illinois Central contracts the relining of its journal bearings and the manufacturing of brass castings. Scrap brass and journal bearings for relining are sent to the foundry in a box skid, each skid containing approximately 5,000 lb. These go to the foundry in carload lots, 18 to 21 skids in a car. The skids are placed in cars by means of electric lift trucks. The actual saving in labor in loading each car is $17.50. After the skids are placed in the car, they are braced by means of steel tape. On the arrival of the car at the foundry, the skids are unloaded with an electric lift truck, at a considerable saving to the foundry and the foundry returns the skids loaded with relined or new journal bearings or new engine brass. In order to save rehandling of these bearings at the general store, shipping instructions are given the foundry to ship direct to the more important outlying stores, the skids being used in making these shipments the same as if the shipment were made to the general store. The outlying stores then return these skids to the general store with scrap brass and journal bearings for relining. Manual handling has thus been entirely eliminated.

Savings Large

The concrete roadways constructed and the equipment purchased represent an outlay of approximately $90,000. A carrying charge of approximately $40,000 a year on this investment is considered liberal, counting interest, as much as 10 per cent depreciation on the roadways and 20 per cent on the motor equipment, and considering also the cost of repairs and operation. This charge is offset by a direct saving in the 1927 payroll of the Burnside store (all direct forces, including stockmen and general foremen) as compared with the average payroll on the same basis for 1920, 1921, 1922 and 1923, of $81,019, notwithstanding an increase of 35,534 tons handled in and out of cars in 1927 over the average tonnage handled during the four years in question. Figured on a cost per ton basis,

Skid Loads of Material Leaving the Car for Delivery to Storehouse or for Transfer

using the same method of arriving at the number of tons handled during the two periods and dividing the total payroll by the tons handled, the gross saving amounted to $107,542, giving a net saving, after deducting carrying charges on the equipment and roads, of $67,542. In arriving at these results, any savings made by other departments have not been considered by reason of the fact that the Burnside plant has taken over the work formerly performed by supply trains



Materials Received at General Store Are Left on Skids for Shipment Instead of Being Unloaded if Books Show Unfilled Orders for Other Stores

in delivering material and supplies to the Chicago terminal.

In addition, they do not allow for the savings to the company in having the store department take over the work of keeping all fire roads open. The economy of this was recently demonstrated when the transport service equipped with plows and drags cleared the roadways of a snow blockade which would otherwise have required the labor of 50 men for two days.

Supervision Important

It should be emphasized that organization and supervision have been important factors in getting these results. The principal problem is to see that the motorized equipment is kept working. Supervision is also directed to avoid wasteful operations or those subjecting the machinery to damage. It has been found that only experienced operators should man the machines and that operators should not be expected to handle material. Furthermore, employees are prohibited from riding on the tractors and the drivers are cautioned against carrying quantities of material which can be handled just as well by hand. In this connection employees are instructed to consider a truck as equivalent to two men. To further the efficiency of the work, arrangements are now being made to keep a detailed record of the cost of repairs to the equipment by providing a card for each machine, and attention is also being given to extending the practice of handling material between dealers and other stores on skids.

A FIREMAN of the Denver & Rio Grande Western has been sentenced to serve 60 days in jail for misuse of railroad passes. He secured the passes in his wife's name and permitted other persons to use them. Judge George C. Foster heard the case and pronounced the sentence.

Iceland to Have a Railroad *

By Earl Hanson

WITH the granting last year of a concession to a Norwegian concern, the Icelandic nation seems at last on the point of losing its position as the only European country of a size larger than a municipality that has no railroad. The Norwegian concession deals mainly with a 160,000 h. p. hydro electric development, but it also specifies the construction of a railroad.

At one terminal is the city of Reykjavik, with an excellent harbor and 22,000 inhabitants, and the neighboring town of Hafnarfjordr with 3,000 inhabitants. At the other end of the proposed line, 41 miles to the east, are the fertile Southwestern lowlands, the best agricultural districts in Iceland, with a total population of over 9,000 inhabitants. The intervening territory is waste land, barren, hilly and some thirty miles wide, at present crossed by a highly unsatisfactory automobile road that is often made entirely impassable by winter snows. The direct importance of the proposed railroad lies in the fact that Reykjavik and Hafnarfjordr are largely dependent on the agricultural districts east of them for their supplies of milk and fresh meat and may soon, considering the progress of Icelandic agriculture, receive their vegetables from there instead of from the European mainland. The future importance lies in the development of the country's agriculture and commerce, which have already made it possible to place Icelandic dairy-products and frozen mutton on the British market and which may eventually, if the estimates in Gjerset's "History of Iceland" are correct, enable the agricultural district of the southwest to supply food products for the whole Icelandic nation.

Upper—A Popular Present Form of Transportation

Middle—View of Hafnarfjordr

Lower—Sheep Herd with Turf Barn in Background

Iceland is rapidly emerging from the pioneer stage in which it languished for centuries and taking its place as a unit in world-commerce. The country, and with it the proposed railroad, is of great potential importance to England, only three days away by steamer and always a market for fresh foodstuffs.

The proposed railroad will be electrically operated and extend from Reykjavik almost all the way across the agricultural lowlands, to the power site on the river Thjorsa. While nothing definite has been published about the final studies and plans, investigations made some years ago serve as a basis for all future work.

These investigations were made in 1923 by an officer of the Norwegian State Railways, at the request of the Icelandic government. His report was published at the time in the Icelandic engineering paper "Timarit Verkfaedingafjelags Islands," and was checked and revised in 1926 by the Icelandic engineer, Highway Commissioner Geir Joega. Estimates of costs and probable returns were made; and compared, to the advantage of the railroad, with an alternative proposition of a macadam road with motor coaches for passengers and freight facilities of three-ton, four-wheel drive trucks, with two trailers each.

Route Covers 41 Miles

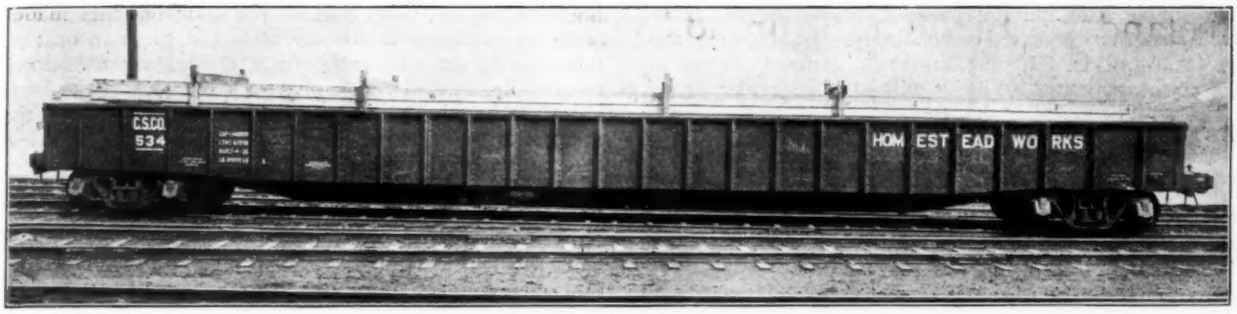
The railroad discussed in these reports did not extend as far as the one covered in the so-called "Titans-concession," but extended from Reykjavik across the barren hills, to the river Olfusa, on the western edge of the agricultural districts. The present proposed railroad covers the same route, but extends a few miles farther eastward over level territory. The route between Reykjavik and Olfusa covers a distance of 41 miles, with a maximum grade of 2.2 per cent and a maximum curvature of 11 deg. It runs over rather easy ground all the way, partly over gravel plains and grassland and partly through lava-fields which now and then are uneven and hilly. No tunnels are necessary and, in contrast with the extension westward to Thorsa, no rivers of any magnitude have to be crossed. The most elevated point is 930 ft. above sea-level. The total grading is 414,000 cu. yd. of cut and fill, and ballast amounts to 124,000 cu. yd. For snow protection only a few sheds at the points of maximum drift, built mainly of earth and stone, are necessary.

Cost estimates of 1926, for the 41 miles of road, unequipped, are as follows:

Grading	$ 385,000
Superstructure	375,000
Bridges and culverts	55,000
Rolling stock	131,000
Stations	182,000
Telephone	8,000
Fencing	5,000
Crossings	10,000
Barracks and tents	4,000
Administration and contingencies	125,000
Total	$1,280,000

According to the estimates of probable traffic (based on existing highway traffic) the road should pay handsomely on the investment from the very beginning of operation, with still greater earnings in prospect as the facility makes possible the development of the country.

* Based on a paper presented by the writer before the Railroad Division, Metropolitan Section, A. S. M. E., New York, on March 1.



A Side View of a 65-ft. Gondola Developed by the Carnegie Steel Company for Loading Mill Lengths

A 65-Ft. Car for Steel Loading

A development by Carnegie Steel Co. which indicates the possibility of avoiding double loading

DURING the rebuilding of the structural mills at the Homestead (Pa.) Steel Works of the Carnegie Steel Company, a situation was encountered which caused considerable anxiety to the transportation department of that company and which presented a difficult problem. The management, in making plans for the rebuilding of these mills, decided that so far as was physically possible the operation of the mills would continue throughout the rebuilding program. To do this with any degree of efficiency, it was decided that the shipping department must give up a good portion of its facilities. With the loss of these facilities, it was found that it would be impossible for the shipping department to cut, load and ship the finished product of the mills from the point of production. To perform this work, it was decided to transport the long lengths of steel from the rolls to a new shipping yard, located a considerable distance south of the mills, which entailed a movement over the tracks of the Carnegie Steel Company and thence over the Union Railroad. It was then found that to do this would require literally thousands of double loads. Many ideas for handling this material economically were advanced, including a suggestion that the Carnegie Steel Company acquire a number of cars of such length as would permit the loading of the steel in one car, thereby eliminating, not only great expense for material and labor in blocking the loads, but saving considerable track room, which at that time was greatly needed. This suggestion was not favorably received at first, but later was approved, with the result that orders were placed with the Standard Steel Car Company for the building of 12 such cars. These cars are probably the longest ever built for commercial service and are dimensioned as follows:

Length inside	65 ft. 0 in.
Length over striking plates	68 ft. 9 in.
Width inside	7 ft. 8⅞ in.
Width over all	8 ft. 6 in.
Distance between truck centers	55 ft. 10 in.
Distance center of truck to inside face of knuckle	7 ft. 8½ in.
Height of sides	3 ft. 0 in.
Marked capacity	140,000 lb.
Average light weight	67,000 lb.

It will be noted that the width of these cars is somewhat less than the ordinary mill type gondola. This width was decreased in order to give ample clearance in rounding short curves. The cars were delivered and put into service in April, 1925.

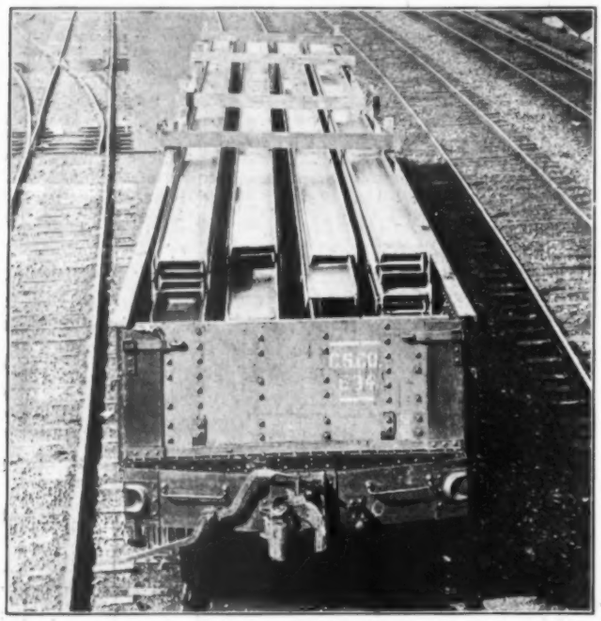
Upon delivery, there still existed considerable skepticism as to the ability of these cars to negotiate short curves within the mills, and there were fears as to their clearing ability in the mill yards. After almost three years of operation, however, their efficiency has proved to be beyond expectations. While the cars were built to negotiate curves having a 200-ft. radius, they have successfully operated over curves having a radius of 175 ft. The cars have hauled thousands of tons of steel since 1925 and have traveled thousands of miles within the Homestead Steel Works and on the line of the Union Railroad. They have also traveled over parts of the Bessemer & Lake Erie and the Pittsburgh & Lake Erie, and in addition have moved over the lines of several of the terminal switching roads in the Pittsburgh district. The success with which these cars have served the purpose for which they were built has given rise to the thought of further testing them out in actual trunk line movement with a view of determining their possibilities in general service.

Steel manufacturers are being confronted each year with demands from their customers for shipment of increased lengths of their products. Stock lengths of 60 to 65 ft. are now generally common to the majority of fabricating shops. It is estimated that the 65-ft. type of car will handle probably 80 per cent of the long lengths of steel now being ordered from the various steel manufacturers. It has therefore been pointed out that should these cars be found capable of service over the trunk lines, a considerable saving would ensue to both the carriers and the shippers. It is not expected nor is it advocated at the present time that the carriers should provide themselves with this long type of car to replace the standard mill type gondola car in entirety. The ordinary mill gondola with drop ends, having inside length of from 42 to 50 ft. serves admirably for general purposes and for the handling of shorter lengths of steel.

The Use of the Longer Cars Should Result in Operating Economies

The cost of the 65-ft. car, it is estimated, will be slightly over 50 per cent of the cost of two ordinary gondola cars. Maintenance and depreciation on one 65-ft. car will of course be considerably less than the same charges against two of the mill type cars now used for making double loads. Since the track space taken by the 65-ft. car will be 30 per cent less than that of

the double load, yard capacities will be increased and train lengths decreased accordingly. In shipping steel in double loads, the possibilities of damage are greatly enhanced, which possibilities will be considerably lessened by the shipping of the same materials in single cars and would therefore result in a saving to the carriers. In the elimination of dunnage by using the single car, the carriers will haul less deadweight per ton of revenue traffic moved. The elimination of dunnage will also help partially to solve the "dirty car" problem, which recently has been the subject of much discussion between the carriers and shippers. Train resistance will be reduced due to the fact that twin shipments, particularly flexible materials which rest heavily on sliders and haul heavily on curves owing to the lateral movement of the lading when rounding curves, would be reduced by using the single car instead of the double load. There is also a greater element of safety in a single load than in a double load.



On Account of Its Length, the 65-ft. Gondola Is Narrower Than the Ordinary Car of This Type

The greatest saving to steel shippers will of course be found in the elimination of the expense of blocking the double load. To one not accustomed to shipping double loads this may seem trivial, but to the producers who ship considerable quantities of their product in such a manner it is not an insignificant item. The elimination of the double load will also enable shippers to load cars more promptly. Since the one car will take up 30 per cent less space than the two cars now required for a double load, the loading track capacity in the steel mills will be increased accordingly.

Recently a party of 50 railroad and industrial transportation officers had the opportunity of inspecting these cars at Homestead Steel Works and of witnessing a demonstration of their handling in actual service. Curves with a radius of from 150 ft. to 220 ft. were successfully negotiated by the 65-ft. car. However, on the 150-ft. curve, an empty gondola next to the 65-ft. car was lifted from the rails. The cause of this derailment was ascribed to the fact that the 65-ft. car, which of course was an experiment when built, was constructed with a distance of 7 ft. 8½ in. from the center of the truck to the inside face of the knuckle, thereby creating an overhang in the car body too great to operate successfully on extremely short curves when coupled to cars constructed with a shorter dimension at the same point, the car with the long body overhang pulling the car of shorter construction off the track. This is a defect in construction which was revealed only by experience and which is capable of correction when building additional cars of this length. The underframe of the 65-ft. cars now in use at Homestead Steel Works has a track clearance considerably less than the standard cars now operating on the trunk lines today. Investigation of this feature has been made and has resulted in finding that the cars will not clear the apex of all humps of the various trunk line yards. This objectionable feature can be readily eliminated in future construction.

Within the near future, the Carnegie Steel Company will ship test loads of these cars from their various plants on the Union Railroad to plants of customers within the Pittsburgh district. These movements will give the carriers and consignees an opportunity to become acquainted with the possibilities of the car. It has already been demonstrated that the cars will ride around curves over which it is impossible to handle double loads in drop-end gondolas loaded in accordance with the present car loading rules of the A. R. A.

* * *

President Crowley of the New York Central Lines (center), Henry Shearer (right) and W. J. O'Brien (left)

Mr. Shearer, assistant vice-president and general manager, Michigan Central, and Mr. O'Brien, general manager of the Chicago River & Indiana-Chicago Junction, holding silver cups they have received as tokens of awards to their companies in an employee safety contest among the 12 N. Y. C. companies

Illinois Central Increased Capacity of Double Track by Either-Direction Signals

Three years' service demonstrates flexibility of system that eliminates written orders and keeps trains moving

Automatic Signal Bridge Showing Signals for Both Tracks for Both Directions

IN 1924 the Illinois Central completed a novel system of interlockings and automatic signalling on 20 miles of double track between Gilman, Ill., and Otto. In this installation both tracks are signaled in both directions so that there is no normal direction of traffic, but trains may move with equal facility in either direction on either track. In other words, the system is that of two single-track railroads side by side rather than a double-track line.

In order to facilitate movements from one track to the other, No. 18 high-speed facing point crossovers are provided in each direction at interlocking plants at each end of the 20-mile section and at three intermediate points approximately five miles apart. Such a system of signaling and interlockings permits the use of both tracks for trains in one direction, thereby making it possible for one train to be run around another and for all trains to be kept moving, rather than to have the slower freight trains stand on passing tracks waiting for faster trains to pass.

Train Movements Directed by Signal Indication

The use of such a system, of course, requires that the rights of trains by class and direction be eliminated. Likewise in order to permit changes readily, the train movements are directed by signal indication without written orders. As long as an engineman gets a signal indication to proceed he keeps going regardless of any other trains on the same time.

The sections of track between interlocking plants are provided with entrance signals at each end, which in addition to functioning as automatic block signals, serve as traffic direction signals. In order to let a train in any section, the operator at the entrance end must secure an "unlock" from the operator at the leaving end, permitting him to clear the entrance signal and making it impossible for the operator at the other end to clear his entrance signal for a train in the opposite direction. Where there are switches between interlocking plants these are locked electrically and in case one of the switches is to be used it must first be unlocked by the nearest interlocking tower operator, therefore, an absolute check is provided for all train movements between towers.

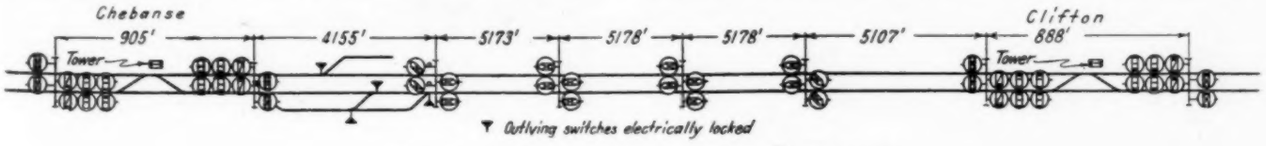
Territory and Traffic Handled

Richton, Ill., 30 miles from Chicago, is the south end of the multiple-track system of the Chicago terminals. From this point south to Monee, five miles, the line has four tracks and thence south to Otto, 25 miles, three tracks. The system of either-direction signals for double track that is discussed here extends from Otto south 20 miles to Gilman, at which point the single-track line to St. Louis branches off to the southwest and the double-track main line continues south to New Orleans. The 20 miles between Otto and Gilman constitute the busiest piece of double track on the system.

The traffic includes from 11 to 13 passenger trains and from 20 to 25 through freight trains each way daily, and one local each way daily excepting Sunday. The through passenger trains make the run of 20 miles in about 24 min., the fast freights in 40 min., and the tonnage freights in 60 min.

How the Dispatcher Uses the System

Northbound freight trains on both the main line and the St. Louis line stop at Gilman for coal and water. Prior to the installation of the new signaling the departure of these freight trains was delayed to avoid interference with the northbound passenger trains. On account of grade conditions a freight train required at least 45 min. to enable it to run from Gilman and clear a passenger train at Ashkum. With the present method of operation, when no southbound trains are due, both tracks are used for northbound trains. With this added capacity most of the freight as well as the passenger trains can be dispatched from Gilman when ready, which has been the means of eliminating considerable delay. Ordinarily trains are operated on the right-hand main and run-around moves are made by crossing the following passenger train over to go around. Experience has shown that a freight train with normal tonnage

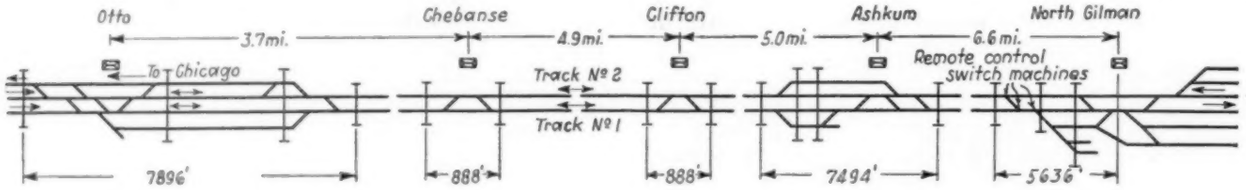


Signaling of Typical Section, Clifton to Chebanse

is so long and travels fast enough that even the fastest passenger train cannot normally cross over behind a freight, run around the freight, and get back to the right-hand track ahead of the freight train in five miles. Such a move is best made by 10-mile diversions. Another way to accomplish the same result is to let the freight train down the left main for a run of five miles to the next plant and in the meantime let the passenger run past on the right main. These crossover movements can be accomplished at any of the five plants; therefore, various combinations are used.

Further relief is afforded when both tracks are being used by trains moving in the normal direction. At Ashkum HX, 6.6 miles north of Gilman, a long passing track is provided for each direction. The inner ends of each passing track are handled by the interlockings and the distant passing track switches are operated by remote power switches controlled from the tower. Likewise remote power switch machines are provided at the south end of the passing track at Otto and also for the switches at the north end of the yard at Gilman. These two power switch layouts assist materially in facilitating freight train movements to and from this double-track section.

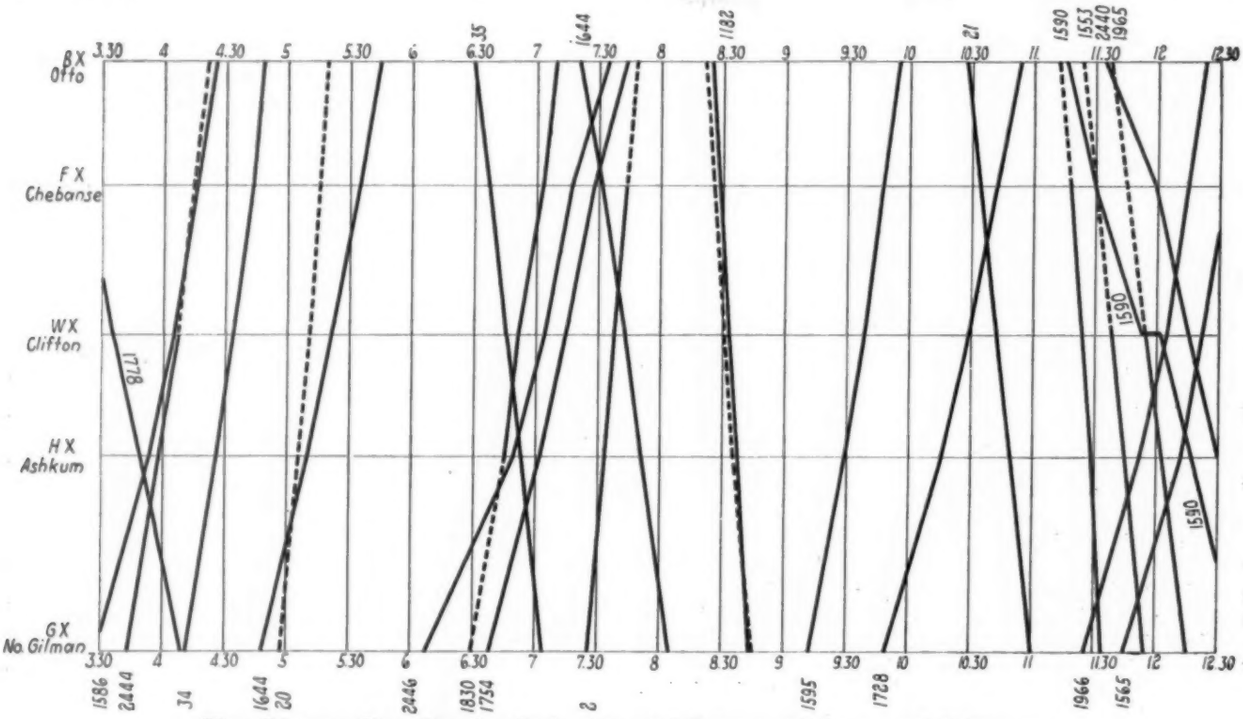
When a freight train is followed closely by a passenger train and the other track is occupied, traffic is kept moving by heading the freight into the long passing track and keeps moving slowly while the passenger runs by. The freight train is then headed out through the interlocked switch without stopping.



Layout of 20-Mile Section of Track Signaled for Both Directions

How the System Is Used

In order to explain the methods of operating trains in either direction on both tracks, a study was made of the dispatcher's train sheets to choose a day of fairly heavy traffic. The maximum traffic handled on the Chicago



Time Distance Chart Showing Trains Operated Between 3:30 p. m. and 12:30 a. m.

LIST OF CARS, TONNAGE, ETC., OF THE TRAINS REFERRED TO IN THE TIME DISTANCE CHART ABOVE:

Northbound

Engine 1586, 57 loads, 4,928 tons—dead freight loading
Engine 2444, work extra, 15 empty ballast cars
No. 34, Chicago mail, 6 cars
Engine 1644, 49 loads, 13 empties, 4,237 tons, dead freight
No. 20, Daylight Special, 7 cars
Engine 2446, 57 loads, 5 empties, 4,845 tons, dead freight
Engine 1830, 47 loads, 2,431 tons, dispatch freight
Engine 1754, 52 loads, 5 empties, 4,258 tons, dead freight
No. 2, fast mail, 11 cars
Engine 1595, 38 loads, 1 empty, 2,926 tons, stock train
Engine 1728, 53 loads, 9 empties, 4,462 tons, dead freight
Engine 1966, 56 loads, 2 empties, 4,800 tons, dead freight
Engine 1565, 55 loads, 5 empties, 4,770 tons, dead freight

Southbound

No. 35, Mattoon passenger, 7 cars
Engine 1182, Student's Special to Champaign, 10 cars
No. 21, Southern Express, 14 cars
Engine 1590, 13 loads, 66 empties, 2,462 tons, dead freight
Engine 1554, 41 loads, 1,643 tons, dispatch freight
Engine 2440, 16 loads, 75 empties, 2,462 tons, dead freight
Engine 1965, 34 loads, 1,528 tons, dispatch freight.

district in any month since the installation was placed in service was in November, 1926, when a total of 343,581,831 gross ton-miles was handled, with a total of 151,014 train miles.

During this period the gross ton-miles per train-mile in the direction of heavy traffic totaled 35,822. The freight engines assigned to this division are the Mikado type with a tonnage rating of 6,335 adjusted tons with an adjustment factor of 15 tons northbound, the direction of heavy traffic, and 11 tons southbound, the direction of light traffic. The average train load in the direction of heavy traffic in November, 1926 was 4,082 adjusted tons, or 3,242 gross waybill tons. Normally the engines are expected to handle, in the winter, about 90 per cent of the tonnage rating. However, the large number of perishable and dispatch freight trains operated in the direction of heavy traffic in this territory has the effect of reducing the average train load.

The Chicago district includes the territory north of Champaign and the data mentioned above cannot be separated for the 20-mile section from Otto to Gilman. However, the same locomotives and tonnage ratings operate over the entire district and trackage is provided to permit the same speeds. Therefore, the data represent an average for the section under discussion.

November 19, 1926, was chosen as a day on which the train operation was typical and a time-distance chart was drawn, illustrating the movement of the trains on this day. The section between 3:30 p.m. and 1:30 a.m. was chosen as it included some of the most interesting movements. Trains using the right-hand main in the direction in which they were moving are indicated by full lines while if they were crossed over to run on the left-hand track the movement is shown as a dotted line. The traffic included 11 passenger and 25 freight trains northbound and 12 passenger and 21 freight trains southbound or a total of 69 trains for the day.

Northbound freight train, No. 1586, left GX at 3:28 p.m., followed at 3:43 p.m. by a more important fast freight, No. 2444. Before reaching WX both of these trains met southbound freight train, No. 1778, and at WX train No. 2444 was crossed over to the southbound track. As No. 2444 was the faster train it passed No. 1586 before reaching FX tower and passed BX tower about 6 min. ahead of No. 1586.

When no southbound trains are due the entire 20-mile section can be used for train moving against the current, as for example, northbound passenger train No. 20 leaving GX at 4:57 p.m., ran on the southbound track all the way, passing northbound freight train No. 1644 on its own track.

When a passenger train is operated in two sections and delivered at about the same time from the three-track system north of Otto BX, these trains can frequently continue through the 20-mile section to Gilman GX on approximately the same time by using both tracks. As an example: southbound passenger train No. 3 (shown dotted) passed Otto at 8:21 p.m. on the left-hand track and train No. 1182 passed the same point about three minutes later on the right-hand track. Being a little faster it reached Gilman about one minute ahead of No. 3.

Perhaps the most interesting operation was between 11:12 p.m. and 1:30 a.m., during which period there were nine southbound and four northbound trains, four of the southbound trains making use of the left-hand track for run around movements. In this period no train was required to take siding and only one train was stopped, and one train was delayed, i.e., No. 1590 southbound on the right-hand track had to wait about two minutes at WX for No. 1965, southbound on the left-hand track, to pass by and cross over to the right-hand track ahead of No. 1590. About seven minutes more were required to operate and re-aline the crossovers and enable No. 1590 to get under way and clear the plant.

The chief dispatcher and the first-trick dispatcher on this territory who have both had years of experience in directing the movement of trains on single, double, and three track lines, agree that the system of signaling and interlocking provided between Otto and Gilman materially increases the capacity of the 20-mile section of double track and eliminates many delays.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading during the week ended February 25, which included the holiday on February 22, amounted to 869,590 cars. This was a decrease of 49,268 cars as compared with loading in the corresponding week of last year and of 43,345 cars as compared with 1926. Grain and grain products and live stock were the only commodity classifications which showed an increase as compared with loading a year ago. With a total of 173,462 cars, coal loading was 28,295 cars lighter than in the corresponding week of 1927. Loading in the Northwestern and Central Western districts was slightly larger than a year ago. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, February 25, 1928			
Districts	1928	1927	1926
Eastern	195,183	208,100	220,184
Allegheny	170,434	186,487	187,950
Pocahontas	51,843	56,664	51,385
Southern	143,346	153,745	154,790
Northwestern	111,048	110,692	108,407
Central Western	130,533	129,213	120,004
Southwestern	67,203	73,957	70,215
Total Western Districts	308,784	313,862	298,626
Total All Roads	869,590	918,858	912,935
Commodities			
Grain and Grain Products	45,987	43,187	39,793
Live Stock	30,268	27,485	26,642
Coal	173,462	201,757	180,470
Coke	11,370	12,300	16,607
Forest Products	65,077	67,796	74,002
Ore	7,310	9,624	10,818
Merchandise L. C. L.	225,882	232,509	237,144
Miscellaneous	310,234	324,200	327,459
February 25	869,590	918,858	912,935
February 18	887,891	954,794	932,281
February 11	906,009	962,602	917,625
February 4	926,204	965,664	914,491
January 28	902,832	943,879	925,696
Cumulative total, 8 weeks	7,037,417	7,558,578	7,364,028

The freight car surplus during the period ended February 15 averaged 369,421, as compared with 369,469 cars on February 8. The total included 158,611 box cars, 160,913 coal cars, 23,636 stock cars and 13,631 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended February 25 totalled 61,087 cars, a decrease from the previous week of 3,524 cars, and an increase over the same week last year of 262 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
Feb. 25, 1928	61,087	39,266
Feb. 18, 1928	64,611	41,421
Feb. 11, 1928	65,928	41,628
Feb. 26, 1927	60,825	38,754
Cumulative Totals for Year		
Feb. 25, 1928	500,427	299,697
Feb. 26, 1927	475,482	296,208
Feb. 27, 1926	441,553	280,332

John R. Kenly, Head of Atlantic Coast Line, Dies

Veteran of Confederate army and a railroad man for sixty years, succumbs at eighty-one

JOHN R. KENLY, president of the Atlantic Coast Line, died at his home in Wilmington, N. C., on March 1 at the age of 81 after a brief illness, his death closing a career of almost 60 years in the railroad business.

When Mr. Kenly went with the Coast Line, in 1885, it was in reality only a through route of connecting railroads, with a combined mileage of about 1,500. When he was elected to the presidency in 1913 the road had grown to an operated route mileage of 4,568. At that time it had an investment in road and equipment of $155,000,000 and a mileage of second main track of 138. Now it operates a route mileage of about 5,000, including some 680 miles of double track, and shows an investment in road and equipment of more than $260,000,000. Moreover, the Coast Line is the parent company of a system which controls several other important properties, chief among which is the Louisville & Nashville, the owned and controlled route mileage totaling over 14,000.

John Reese Kenly

Mr. Kenly, therefore, saw and shared in the development of the company from its virtual inception as a miscellaneous group of small roads just emerging from the status of local carriers to that of an important through route. He left it as one of the outstanding carriers of the country—modern, profitable and rendering a high grade of service to its patrons. Freight traffic during the period of Mr. Kenly's presidency increased more than 100 per cent and passenger traffic likewise showed a substantial increase. During the entire period of his presidency dividends were maintained, varying from 5 per cent to 10, a regular 7 per cent holding over most of the period, the 10 prevailing latterly.

This period has, of course, witnessed great growth in that part of the South which the Coast Line serves, but the road has kept up with the progress of its territory. To this the large increase in double track, the substantial additions to route mileage and the road's consistent program of additions and betterments testify.

John Reese Kenly was born in Baltimore, Md., on January 21, 1847, and was educated in the public schools. While still a youth he joined the Army of the Confederacy and fought through the last year of the Civil War. He was at Appomattox in General Lee's army when Lee surrendered. In July, 1868, he began his railroad career with a surveying party on the Pittsburgh & Connellsville (Baltimore & Ohio) and was later appointed resident engineer of construction, in which capacity he remained until 1871 when he entered the service of the Union Railroad of Baltimore (Pennsylvania tunnels) in the same capacity. Two years later he became engineer and roadmaster for that same company and, in 1876, was appointed engineer and superintendent.

In 1882 he resigned to become superintendent of the Richmond & Petersburg, which is one of the predecessors of the present Atlantic Coast Line. In 1885 he went with the Atlantic Coast Line proper as superintendent of transportation and from that time on his service with that property was continuous, and his progress steady.

In 1889 he became assistant general manager and in 1891 was further advanced to the position of general manager. In this capacity he remained for eleven years. It was during this period that the welding of the various component properties into one company was accomplished and also in the latter part of it control of the Louisville & Nashville was acquired. Mr. Kenly in 1902 was given the title of fourth vice-president in addition to that of general manager. In 1905 he was elected third vice-president and remained in that position until December 8, 1913, when following the death of President T. M. Emerson, Mr. Kenly was elected his successor. In this capacity he remained until the time of his death.

A TRAIN of 81 cars was switched and sorted within 29 minutes, at the Boston & Maine's new classification yard at East Somerville, Mass., on a recent date. This record is published as showing what can be done with the facilities of the new yard which include car retarders. Of 16 trains received the same morning, 13 were switched in less than one hour each. Excluding the time required for making out switching lists, inspection of the train and other auxiliary functions, the cars in the train mentioned were separated and re-assembled in less than 15 minutes, or at the average rate of six cars per minute of work.

Problem of Railroad Consolidations*

Advantages anticipated from progress in this direction and conditions and legislative provisions that prevent it

By Dr. C. S. Duncan
Economist, Association of Railway Executives

THERE are still nearly 2,000 operating, lessor and industrial railroad companies in this country. Of these a considerable number are either industrial, narrow gage, or other very small railroads that have only local significance and are not of any fundamental importance in the general national transportation system. In practical operation there are, therefore, between fourteen and fifteen hundred independent railroad corporations, with great variety in size, volume of traffic, credit standing and operating problems. With all the unifications and amalgamations that have taken place there still remains a very large number of independent railroad corporations operating under an infinite variety of conditions throughout the length and breadth of this country.

The advantages of consolidations of the past have never been questioned and so far as I know it is an accepted premise that the railroad unifications which have taken place in earlier years and out of which have grown the great transportation systems of today, have resulted in more efficient, more adequate and more satisfactory transportation at lower cost. There has been no suggestion by any one that the present great systems be torn apart and resolved into their constituent properties in the public interest or to better the service or to reduce the cost.

Changes in Public Attitude

What has been the attitude of the public toward this continued process of unification and amalgamation of railroad properties? The two chief tenets of the public attitude, if such a vague thing can be held within the bounds of definition, at least in the earlier years of railroad development, were individualism and competition. Under the first tenet, everybody was as good as everybody else and every American boy had his fair chance to become President of the United States. Under the second, economic justice was to be attained through the medium of free and unrestricted competition. Who could define a fair price which the consumer should pay for the necessaries of life? Who could determine the price at which the producers of the country should sell their products and particularly the agricultural products? Who could determine a just and reasonable freight rate?

The answer seemed to be—No one. But that fair price to the consumer and that fair price to the producer and that fair freight rate could be most nearly attained through the medium of free and unrestricted competition.

Furthermore, it appeared generally to be the feeling that the greater the competition the better. It would mean higher prices to the producer and lower prices to the consumer.

This broad principle was early applied to the railroads. After the wave of enthusiasm which resulted from the actual securing of railroad transportation service had somewhat waned and railroads had multiplied to the extent where competition began to be felt and along with the growing resentment on the part of agricultural producers against the existing freight rates, the public mind turned to this principle as the means of solving their problem. Like those ardent advocates of peace who are willing to fight for it, there were advocates of competition who were willing to compel it by legislative action. Big business was necessarily bad, they held, and large railroad systems were necessarily an evil.

Generally speaking, this seemed to be the motive behind the creation of state commissions and the state and Federal legislative acts culminating perhaps in the Act to Regulate Interstate Commerce in 1887 and the Sherman Antitrust law of 1890.

The legislative action, as representing public opinion, for thirty years prior to the Transportation Act, 1920, had been based upon the economic theory that public interest was best served through enforced competition, both in rates and in service, between the rail carriers. The Interstate Commerce Commission and the Department of Justice were enjoined, as for instance in the Clayton Act, to keep a vigilant eye on the general activity of railroad managers and to prevent by force of law and threat of severe penalties not only discriminations, rebates and unjust and unreasonable rates, but any substantial diminution of competition between competing carriers.

This thirty-year period also presents the interesting situation where legislative activity continued toward the goal of enforcing competition between the carriers, while, at the very same time, practical experience and an increasing knowledge of the essential characteristics of railroad operation were undermining the very basis of such legislative action.

Within six years after the decision in the Northern Securities case the Supreme Court rendered its decision in the Standard Oil case, framed its famous phrase, "in the light of reason", and softened the hard terms of the Sherman Antitrust Law. The Standard Oil case was followed by the Tobacco case, and yet in 1912 the Interstate Commerce Act was amended so as to prohibit pooling of freight and earnings and in 1914 the Clayton Antitrust Act was passed to prohibit any substantial lessening of competition.

Gradually, during the later years of this period, there came a change in the public attitude and in the attitude of public representatives in Congress. In 1916 began very extensive hearings on the railroad situation by the Newlands Committee of the United States Senate that aided in a better understanding of railroad economics. When the railroads emerged from Federal control and the law was framed for their regulation as private enterprises, it seems to have been clearly in the minds of the public, of regulatory bodies and of Congress, that Federal and state control and regulation of railroads might take the place of antitrust acts and that the public

* From an address delivered before the Traffic Club of Chicago on March 5.

interest might not only be safeguarded but also promoted by again permitting the railroads to make progress in the consolidation, merger or unification of their properties. It appeared also to be their conclusion that competition in freight rates to any substantial extent, even under strict supervision, was not wise or in the public interest. The generally accepted reason for this change in attitude was that the railroads are compelled by economic laws to charge the same rate when in direct competition in the same territory.

There can be no doubt that the realization of these facts by the public and by the Federal Congress has been a most important element in leading the legislative minds, in the Transportation Act, to relieve the railroads from the provisions of the Federal and state anti-trust laws to the extent of permitting them, under proper supervision, to unify even competing lines in the public interest.

Consolidation Provisions of Transportation Act

It was through this devious course of economic history and changing attitude that we arrived at a situation where the Federal law endorsed the principle of consolidation between competing carriers, with proper safeguards. This endorsement is found in Section 5, paragraphs 2 to 8, of the Transportation Act, 1920.

The advantages sought by the consolidation provisions of the Transportation Act, as gleaned from Committee hearings and Congressional debates, are these:

1. The rehabilitation of railroad credit, in order that transportation facilities may keep step with the increasing demands for transportation service.

2. The maintaining of transportation facilities, adequate and efficient in character for the service of all communities throughout the country.

3. The solution of the "weak line" problem, involving thousands of miles of road.

4. The simplification of rate-making for the railroads as a whole, in that rates would not have to be raised so as to give strong carriers larger revenues than they need in order that weaker lines may live, but rates may be placed upon a sound economic basis.

5. Competition between strong, well-balanced, evenly matched systems to maintain competition in service for an honorable rivalry among men as the most powerful stimulus known to human effort.

6. The realization of economies in railroad operation (a) from a more economical use of equipment, (b) through more direct routing of freight, (c) by eliminating circuitous routes, (d) through a reduction in switching costs, (e) through a standardization of methods, equipment and practices, (f) through a centralized accounting system, with the elimination of interline accounting, (g) through maximum use of shops and equipment, and (h) through the concentration of purchasing power in a single agency, and otherwise.

In brief, the consolidation provisions of the Transportation Act provide—

(a) For the acquisition of control by lease, purchase of stock or otherwise, to the extent indicated by the Interstate Commerce Commission, in a "manner not involving the consolidation of such carriers into a single system for ownership and operation."

(b) The preparation and adoption by the Commission of a plan for the consolidation of the railway properties of the continental United States into a limited number of systems, preserving competition as fully as possible and the existing routes and channels of trade and commerce as far as practicable.

(c) The resulting systems to be of as nearly equal competitive strength as possible so as to be able to successfully operate under uniform rates.

In preparing and adopting a plan the Commission was to agree upon a tentative plan, arrange for hearings and then adopt and publish a permanent plan. Thereafter consolidations could only take place in harmony with such final plan.

The Commission, as is well known, promulgated a tentative plan in 1921, upon which hearings were held for more than two years. The Commission's tentative plan was based upon a report made to it by Professor W. Z. Ripley of Harvard University which outlined twenty-one systems for the railroads of the country. This plan, however, did not include or make any reference to some 39,000 miles of road. Its longest system consisted of 22,889 miles of road and its shortest system, 764 miles. The Commission modified this by reducing the number to nineteen systems but still did not include the 39,000 miles of road formerly omitted, or deal with the terminal situation.

The tentative plan of the Commission provided for five systems in the Eastern trunk line region based, respectively, upon the New York Central, the Pennsylvania, the Baltimore & Ohio, the Erie and the Nickel Plate—Lehigh Valley. The New England roads were all thrown together. The railroads in the state of Michigan were thrown together into one system. The coal roads of the Pocahontas region were to constitute two systems, one based upon the Chesapeake & Ohio with the Hocking Valley and the Virginian, and the other upon the Norfolk & Western, with the Toledo & Ohio Central to enable it to reach the lakes. In the southeast there were to be three systems, one based upon the Southern Railway, one based upon the Atlantic Coast Line and Louisville and Nashville, and the other upon the Illinois Central and Seaboard. In the Western region there were to be seven systems, one based upon the Union Pacific-Chicago & Northwestern, one based upon the Burlington-Northern Pacific, one upon the Milwaukee-Great Northern, one upon the Santa Fe, one upon the Southern Pacific-Rock Island, one upon the Frisco- Katy-Cotton Belt and one upon the Missouri Pacific with the Chicago & Eastern Illinois to enable it to reach Chicago. The whole scheme pivoted upon the Pacific ports at San Francisco and Seattle, the Atlantic ports from Boston to Jacksonville, and the Gulf ports of New Orleans and Galveston. In the interior the pivotal points were St. Louis, Chicago, with secondary cities illustrated by Atlanta and Kansas City.

Great objection was raised to this tentative plan from various sources. Several other plans were offered the Commission, ranging from a single system to fourteen. Perhaps of particular importance has been the continued discussion of whether or not there should be four or five systems in the Eastern trunk line territory. Those who contend for a four system plan have based these systems upon the New York Central, the Pennsylvania, the Baltimore & Ohio and the Erie-Nickel Plate. It has been continuously urged, however, that there is room in this region for a fifth system, including such roads as the Delaware & Hudson, Lehigh Valley and Buffalo, Rochester & Pittsburgh.

The Commission, however, has not yet adopted and published a final plan. For the past four years it has urged in its annual reports to Congress that it shall be relieved from the Provisions in the Transportation Act requiring it to adopt such final plan.

Meanwhile, under paragraph 2 of Section 5, permitting control through stock ownership or lease and declared by Senator Cummins, who sponsored the bill, to be merely an *ad interim* provision, there have been 231 applications approved by the Interstate Commerce Commission, affecting 38,255 miles of road. These are not technical consolidations as contemplated by the Trans-

portation Act. With but two possible exceptions of importance, these approvals have been in harmony with the tentative plan published by the Commission. Important proposals for unification that have not been in harmony with this plan have been refused. The most striking example is that of the Nickel Plate unification proposal of 1925.

The Present Issues

I have up to this point endeavored to explain what consolidation is, how far we have gone in the matter and how we got there. Let us see what the issues are which we now face.

We have on the statute books federal legislation to the effect that the railroad properties of the country shall be consolidated into a limited number of systems. We have as the object of this legislation true technical consolidation for ownership and operation, and operation as well as ownership, of these properties.

After eight years no such technical consolidation has been realized. Considerable activity, however, has gone on under provision—paragraph 2 of Section 5—by means of which control through stock ownership and lease has been secured over a considerable mileage. The main issue, therefore, arises as to how to proceed. Why does not the Commission promulgate a final plan? Why do not the railroads consolidate?

It is obvious that the railroads cannot proceed to consolidate until the Commission has published its final plan. The Commission now says that it is unable to determine upon a satisfactory final plan. There is thus interposed one great obstacle in the way of consolidation.

In the second place, the Transportation Act, 1920, does not grant to the carriers the power to enter into and carry into effect the desired consolidations, even though they have been approved and authorized by the Interstate Commerce Commission. It is, of course, clear that before a railroad company can consolidate with another there must be in both companies the unmistakable power through charter provisions or in the statute authorizing the consolidation. But now railroad companies must look for the means of consolidation to the states of their incorporation and the other states through which their lines run. They find that the terms and conditions of the states vary, that state laws do not operate beyond the limits of the state, that some conditions are impossible to meet and that in some states there are specific statutory or constitutional prohibitions.

There is also the exceedingly delicate and vexing question of the dissenting minority stockholder. While his rights must be protected and fully protected, he should not be permitted to make unfair and unjust demands or to hold up a consolidation program beneficial to the public for the purpose of securing private gain for himself. This vexing question is not fully met in the existing law.

Under the rigid-plan method provided for by the Transportation Act, there is utter disregard of the essential need of natural economic growth in carrier systems and free and unrestricted examination of economic opportunities to be realized by consolidation. A consolidation of railroads, like the consolidation of any other business, should be a normal, natural growth. It can not be compelled to conform to any arbitrary and artificial plan to be made out of hand by the Commission. Here is another obstacle in the way of consolidation progress.

The consolidation provisions of the Transportation Act involve the valuation of railroad properties under Section 19a. As is well known, the principles of valuation are not yet determined and may not be determined for some time yet. This is a further obstacle.

As the law now exists there would be a very heavy burden of taxes to be borne by any corporation seeking to consolidate railroad companies. Since consolidation is to be carried out as a public policy and in the interest of the public, it is not felt that such a burden of taxes upon the processes of carrying out a policy in the public interest is either fair or just.

These objections are found to be practically insurmountable. The President of the United States has repeatedly asked for some modification of the consolidation provisions of the Transportation Act in order that consolidations may proceed. The Interstate Commerce Commission has asked for modification.

How to Meet the Issues

In order to remove the obstacles enumerated above and to provide for voluntary or permissive consolidation among the railroads, various bills have been introduced into Congress during the past four years. There has been a gradual approach toward a meeting of minds among the various interested parties until in the present Congress there has been introduced a bill upon which it was thought practically all have agreed.

This bill, known as the Parker bill in the House and the Fess bill in the Senate, relieves the Commission from the requirement to formulate a plan, grants to railroad corporations the power to consolidate, takes care of the minority stockholder, relieves the burden of capital stock taxes, provides for the weak roads and gives the carriers a period of seven years for voluntary consolidations under the supervision of the Interstate Commerce Commission. It thus removes all of the outstanding obstacles to consolidation progress.

The administration appears to be favorable to the principle of this bill. The Commission approves it. So, likewise, the United States Chamber of Commerce and the National Industrial Traffic League. It seems to be a common belief that railroad consolidation under the provisions of such a bill would be in the public interest, in giving better service, maintaining competition in service, simplifying regulation, realizing economies of operation, preserving to all communities essential transportation service, and placing freight rates upon a sound economic basis.

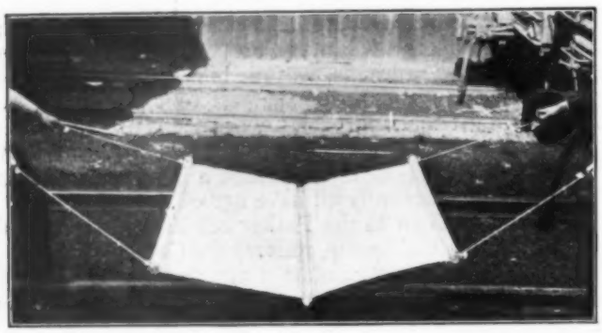
An amendment to the bill has been urged, which would place in the statement of policy a qualification that no consolidations should be allowed that would substantially lessen competition. It is apparent that such a provision would restore the limitations of the antitrust laws. The words, in fact, are taken from the Clayton Act. It would be utterly inconsistent with the theory of the bill and would prevent the consolidation of carriers.

There is here an available way open for permissive consolidation of railroads, with all proper safeguards by the passage of such a bill. If such consolidations are in the public interest they can thus be had. It would seem reasonable to believe that the full benefits of unification of railroad property were not attained when the legislative acts practically "froze" the situation. It would further seem reasonable to believe that the railroads, like other kinds of business, should be permitted to seek that size and type of organization which will enable them to serve the public best. Railroad management ought to be allowed such freedom as is necessary, under proper regulation and supervision, to realize the economies of operation and betterment of service through such consolidation as will enable them to operate on the most effective basis.

Lafoon's Weather Shield for Freight House Work

THE two pair of hands which show in the photograph are supposed to be those of two freight-house men of the Chesapeake & Ohio, at Richmond, Va.; and they are holding up for the reader's inspection, a canvas shield which is in use at Richmond for the protection of workmen when they are trucking freight from one car to another.

With two box cars standing side by side on adjacent tracks, as in transferring freight at large freight stations, the space between the cars, from the door of one to the door of the other, is usually from three feet to five feet; and in rainy weather this opening leaves

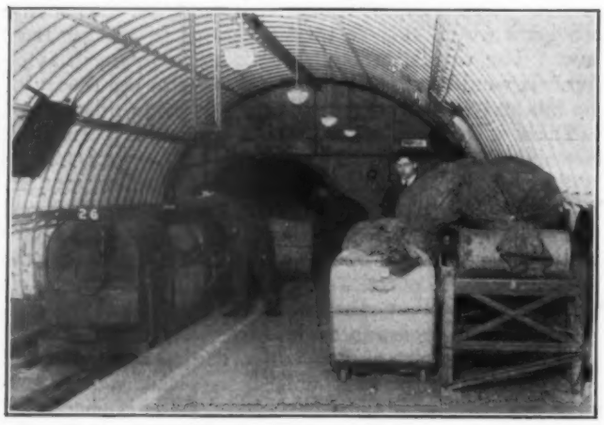


room for a good deal of rain to fall on the heads and shoulders of the workmen and on any goods or parcels which they may be moving.

The canvas shield is designed to afford protection from this annoyance and possible cause of damage. The shield is suspended by the four ropes attached to its four corners, which are fastened to the underside of the roofs of the cars. The reader who will imagine the trough in the center of the picture pouring out rain water at each end, will have a good idea of the function of the shield.

The designer of this device, R. S. Lafoon, general warehouse foreman, has secured a patent. The shield has been in use at Richmond for several months and is giving highly satisfactory service.

* * *



Wide World

Automatic Electric Subway of the London Post Office

The trains operate without drivers at a maximum speed of 35 m.p.h. The system, recently placed in operation, has 6½ mi. of line

Looking Backward

Fifty Years Ago

Officers of Missouri railroads are being notified by the state board of railway commissioners that the law fixing the minimum rates for passengers and freight will be put into effect in April. A number of railroads are just emerging from a 10-year exemption and instead of the 4½ and 5 cents a mile they have been charging the state will enforce a maximum passenger rate of 3 cents a mile on main lines and 4 cents a mile on branches.—*Railway Age,* March 7, 1878.

Two new lines have been organized between St. Louis and Minneapolis and St. Paul and both have begun to run through cars daily. The first is by the Minneapolis & St. Louis, the Burlington, Cedar Rapids & Northern [now part of the Chicago, Rock Island & Pacific] and the Chicago Burlington & Quincy, the distance being 571 miles. The other is by the Chicago, Milwaukee & St. Paul, the Central of Iowa [merged with the M. & St. L.] and the St. Louis, Kansas City & Northern [now the Wabash], and is 589 miles long.—*Railroad Gazette,* March 8, 1878.

The West Wisconsin [now a part of the Chicago, St. Paul, Minneapolis & Omaha], extending from Elroy, Wis., to St. Croix Lake, 177.5 miles, was sold under foreclosure at Madison, Wis., on March 1 to interests representing the Chicago & North Western, which operates the line as its entrance into St. Paul, Minn.—*Railway Age,* March 7, 1878.

Twenty-Five Years Ago

George M. Shriver has been appointed assistant to the president of the Baltimore & Ohio, with headquarters at Baltimore, Md.—*Railway Age,* March 6, 1903.

Three passenger trains of the Chicago, Rock Island & Pacific were caught in snow drifts more than 16 ft. deep near Santa Rosa, N. M., during the first few days of March and were snowbound for 100 hours. About 500 passengers and employees were forced to do without food for 24 hours.—*Railway and Engineering Review,* March 7, 1903.

The bill providing for a union railroad station for Washington, D. C., was passed by the House of Representatives on February 25, having been approved previously by the Senate. It is estimated that the total expenditure for the project, including the elimination of grade crossings, will be about $14,000,000 with $5,000,000 to be expended for the station building itself.—*Railroad Gazette,* March 6, 1903.

Ten Years Ago

On the recommendation of R. H. Aishton, regional director for the western railroads, Director-General McAdoo has provided a plan for the rearrangement of passenger service between Chicago and St. Louis on a non-competitive basis. The 15 passenger trains on the four railroads between the two cities leaving at five different times during the day will be reduced to nine trains leaving their destinations at eight different times during the day.—*Railway Age,* March 8, 1918.

The rule established by the Railroad Commission of Texas, under which a railway is required to start its trains on schedule time, with an allowance of not more than 30 minutes for connections, has been held by the supreme court of the United States to be an unconstitutional regulation of interstate commerce.—*Railway Review,* March 9, 1918.

James M. Kurn, president and general manager of the Detroit, Toledo & Ironton, has been elected vice-president in charge of operation and construction of the St. Louis-San Francisco, with headquarters at St. Louis, Mo.—*Railway Age,* March 8, 1918.

Communications and Books

More Comment on Coupler Flexibility

NEW YORK.

TO THE EDITOR:

In the February 4 issue of the *Railway Age* you published a letter under the caption, "Present Provisions for Coupler Flexibility," from Donald S. Barrows, in which he questions some of the information given by me in a communication under the caption, "Flexibility of Coupler Movement," published in your December 17 issue.

Mr. Barrows refers particularly to the relationship between the center of gravity of center sills, the center line of draft and the coupler flexibility or angling.

In my opinion, a most important consideration in car design is that the center line of draft shall be below the neutral axis of the center sill construction so that the eccentric action due to end shock will tend to relieve rather than to accentuate the tension strain in the bottom fibers of the center sills, near the center of the car. It is for that reason that I favor the ¼-in. clearance above the center line of the draft in the striking casting opening so as to compensate for this buckling action.

With the U. S. R. A. Standard horizontal key yoke, in combination with the A.R.A. "D" coupler, the lateral clearance is quite restricted. The amount the coupler will swing laterally is regulated by the opening between the jaws of the yoke and in the so-called Administration cars it will swing at the coupler horn line only 1¼-in. from the center line.

J. E. MUHLFELD.

Transportation Taxes in England

LONDON.

TO THE EDITOR:

I have been reading your Annual Statistical Number for 1928. As usual, it is a splendid publication, giving an immense amount of information in a very small space.

There is one point in M. Péschaud's article on the French roads which is not quite correct. In his last paragraph he speaks of a levy on passengers of "5 per cent in England." The history of our "passenger duty," as we term it, is not quite so simple.

The story of transport taxes in Great Britain is interesting. There is no tax on railway freight revenue, but duty to the extent of about £400,000 a year is levied on certain passenger fares.

In 1842 the Railway Passenger Duty Act imposed a duty of 5 per cent on all passenger fares. In 1883 the Board of Trade was empowered by the Cheap Trains Act to call upon the railways to carry workmen at low fares. In order to recompense the companies, fares not exceeding the rate of one penny (2 cents) a mile were exempted from duty, and further, the duty was reduced to 2 per cent in respect of fares above a penny a mile in urban districts. For the purposes of the act, an "urban district" was defined as an area of a continuous urban character having two or more railway stations and containing a population of not less than 100,000 inhabitants.

After the war-time period of government control, Section 6 of the Finance Act of 1921 legislated for the resumption of payment of passenger duty. In view of the increased fares now in force, the act provides that—

> Fares not exceeding minimum fares shall be exempt from duty, the expression "minimum fare" being defined as the lowest fare *normally* charged for a single or return ticket.

A curious question has arisen in regard to the interpretation of the new enactment. The British railways issue many cheap tickets under special conditions; for instance, half-day round-trip tickets are issued between some stations after 10 a. m. available for return journey on the same day only. It may easily happen that the first-class fare for a ticket of this description is less than the price of an ordinary third-class ticket which is available for the round-trip within three months (if for a distance exceeding 12 miles). The question at once arises whether the special first-class fares are exempt from duty, and the point is still under consideration.

R. BELL,
Assistant Genl. Mgr.,
London & North Eastern.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Geology of the Paddington-Penzance Line and Its Relation to Scenery and Traffic, by Ernest H. Davison. "It not only covers a complete series of British geological systems from the youngest rocks in the east to the oldest pre-Cambrian rocks in the Lizard promontory, but it shows these systems in a simple and straight-forward manner which is not equalled by other lines covering similar country. . . ." p. 1. Illustrated. 11 p. Pub. by Great Western Railway (London) Lecture and Debating Society, London, Eng., as its Proceedings no. 210, Session 1927-1928.

Monthly Shipments of Fresh Fruits and Vegetables, United States, Average of Three Years 1924, 1925 and 1926, compiled by Bureau of Railway Economics. Points of origin and carloads originated, in charts and tables useful alike to railroaders, economists and persons simply interested in food through the year. Data on 16 fruits and 17 vegetables. 28 p. Pub. by Bureau of Railway Economics, Washington, D. C. *Apply.*

The Ports of San Francisco, Oakland, Berkeley, Richmond, Upper San Francisco Bay, Santa Cruz, and Monterey, California, by Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Shipping Board. Their Port Series no. 12. See Contents (p. III) unde. "Communications" for references to railroad facilities at each of the ports. Illustrations, maps, charts, etc. 317 p. Pub. by U. S. Govt. Print. Off., Washington, D. C. $1.

The Poultry Industry—A Selected List of References on the Economic Aspects of the Industry, 1920-1927, compiled by Louise O. Bercaw. The references to marketing and shipping, costs, and location of the industry will be interesting. Agricultural Economics Bibliography no. 24. 106 p. Issued by Library, Bureau of Agricultural Economics, Washington, D. C. *Apply.*

A Review of Railway Operations in 1927, by Dr. Julius H. Parmelee. "Reprinted by permission from *Railway Age* for January 7, 1928, and figures revised to February 20, 1928," and published as Bulletin 45. 34 p. Pub. by Bureau of Railway Economics, Washington, D. C. *Apply.*

Periodical Articles

Green Rags, by A. W. Somerville. A short story about railroaders. Saturday Evening Post, February 25, 1928, p. 8-9, 49, 51-53, 54.

Hill Country, Part I, by Ramsay Benson. First installment of the biographical novel that won the Forum prize of $7,500. ". . . The railroad was bound to open up a new world and these pioneers were the early birds to whom the proverb assigns the early worm. . . . Jim Hill's name, though not a household word as yet, was being spoken. . . ." p. 355-356. Forum, March, 1928, p. 351-358, 450-456.

Railway Against Motor-Truck in England. An exceptionally amusing cartoon illustrates this review of a serious situation. Literary Digest, March 3, 1928, p. 19.

Odds and Ends of Railroading

The Pullman Company has received a request from a man who was forced to take an upper in the car Aloha, that the car be rechristened Anuppah.

Old railway stations are sometimes put to peculiar purposes, but the one in Vienna, Austria, is probably unique. This station has been turned into a public indoor ski-slide, snow being hauled down from the mountains for the purpose.

The Fort Smith, Subiaco & Rock Island, a 54-mile line in Arkansas, has had fame thrust upon it by the Pullman News. It serves, it seems, such far flung points as Paris and London (both of which are, however, Arkansas municipalities); it crosses the Delaware (creek, not river) and goes through the Dardanelles, (Dardanelle, Ark.) and Subiaco (the original of which is an Italian monastery town).

A Champion Loser

You've all heard the story of the man who said he had lost a bass drum once. In fact, it has appeared in this column. No one believed that it could have been founded on fact, however, until recently, when employees turned into General Baggage Agent Bissland, of the Missouri Pacific, a huge bass drum which someone had lost on the Sunshine Special. Diligent inquiry revealed that Henry Kitcher of Palestine, Texas, was the talented individual who had performed the seemingly impossible. When complimented, Henry responded modestly: "Shucks, that ain't nothing. I lost that drum in a telephone booth once."

De-Georging Porters

At the seventeenth annual meeting in Chicago last month, of the S. P. C. S. C. P. G. (The Society for Prevention of Calling Sleeping Car Porters George) George Dulany, Jr., the founder and secretary, announced that on many recent trips on the Twentieth Century Limited, he had made it a point to walk through the train and see how many porters had George for a name. He said he went through about 100 cars on various sections of the Century and found only one porter assigned to the famous train whose name really was George. "So you see how idiotic is the habit of calling all porters George," said Mr. Dulany. He viewed as a signal victory for the society the recent practice of the Pullman Company of putting porters' names on cards in the cars on crack trains.

Limerick Department

Over in England, they have taken the story of the old lady and the ticket clerk and made a limerick of it, as follows:

There was an old lady of Crewe,
Who wanted to catch the 2.2
She said to the porter, "Don't hurry,
Or worry or flurry,
It's a minute or 2 2 2 2."

All of which, for reasons unknown, reminds us of another story of an old lady and a porter. Querulously, the old lady said: "Porter, there's 20 minutes difference between the time of the clock in the train-shed and the one in the waiting-room. "Don't make no difference, ma'am," the porter replied, "De train goes at 5:15 anyhow."

An American Army Mule-Skinner Needed Here

Railway officers employed at the little station of Cochem in the Rhineland, Germany, or on the jerkwater trains stopping there, have given up an unequal battle with a donkey. This donkey is owned by the local milk dealers' association and has the important mission of pulling the cart with the milk intended for shipment to the station. He has taken it into his head, however, to stop at a certain point alongside the track and to insist that the baggage car must come to a halt there. Attempts to get him to move toward the baggage car in case it was carried a bit beyond him proved futile. He was beaten, tickled, the hose turned on him—in vain. He would not budge. The locomotive engineers have been instructed to humor the beast and bring the milk car exactly where the donkey decrees that it shall stop. "We can order our staff about," sighed the station master, "but rules and regulations mean nothing to an obstinate ass."

Cab Signal Advocate Displays Resourcefulness

KAIGHN'S POINT, N. J.
NEAR PHILADELPHIA, PA.

TO THE EDITOR OF ODDS AND ENDS:

Your department seems to be the one in the *Railway Age* for giving to the reader interesting novelties and, therefore, I make bold to tell you about my invention.

At the hearings before the Interstate Commerce Commission, in Washington, last month, I was much disappointed to hear a lot of locomotive enginemen say that they objected to the use of cab signals in connection with automatic train stops. These signals, consisting of small red, yellow and green lights constitute, in their opinion, an element of danger in that too much attention to the lights may result in too little attention to conditions on the track ahead. A number of signal engineers apparently agreed with this view.

This objection, whether valid or otherwise, is, however, very easily met. All you want is to fix the light where the engineman is obliged to see it, when he is looking out of his front window. It would be of no practical disadvantage if he had to look out through a green window or a yellow window. However, to meet the most meticulous critic, I have designed a combination window. The glass is circular, 18 in. in diameter and, marking out a concentric ring inside, about 10 in. in diameter, and leaving the central portion clear, I have left an annular surface of glass which can be colored. When the road is clear for full speed, I make the upper half of this annular ring green, by dropping down from above a green glass of suitable tint. When caution is to be indicated, this glass is raised and from the lower side of the window is lifted a yellow glass to fill the lower half of the annular ring. No engineman, either the sharpest critic or the dullest objector, can look out of this window without seeing the color which should guide his action in regulating his speed. What objection do you see to this scheme?

The critic who will not accept my proposal may very reasonably be asked to make use of an audible cab signal. We advocates of cab signals have not taken reasonable advantage of the strength of our arguments to put them before the railroad world. Audible cab signals have been used extensively and with great success on the Great Western of England for *twenty-five years;* and we wise men of America calmly remain in our seats and neglect the lesson of this experience.

Finally, to those critics who are still deaf to my appeal, I will say, why do you not put the small red, yellow and green lights (which you now have) in the sill at the bottom of the front window? Red rays or yellow or green rays, these would reach the engineman's eyes in spite of him.

The engineman who wishes to keep his head out of the window most of the time, can of course, be furnished with a set of two or three lights on a bracket extending out from the window. Indeed, the cab signal specialist can give the objector anything that he wants; and is willing to hand it to him on a silver platter.

And please note that no red light or red window is needed. Unless the engineman sees either green or yellow, he must at once bring his train under control. The Chicago & North Western in the admirable arrangement of its automatic train control system, has shown, in a way that should be satisfactory to any one, that the red light is not needed.

ALEX DUR

NEWS *of the* WEEK

On the New York Central at West Point

THE NEW ENGLAND RAILROAD CLUB will hold its annual meeting and election of officers at the Copley Plaza Hotel, Boston, on March 13; dinner at 6:30 p. m., meeting at 7:45. A. A. Northrop of Stone & Webster, Inc., will present a motion picture of the 600,000 h.p. hydro-electric development at Conowingo, Md.

ENGINEMEN AND FIREMEN of the Virginian have had their pay advanced to parity with the increased rates now enjoyed by other railroads in the southeastern states. The advance is retroactive to February 16, only. The increases for the higher paid enginemen are about 6½ per cent.

THE INTERSTATE COMMERCE COMMISSION, Division 6, has issued a report approving after inspection and test the installation of the automatic train-stop system of the National Safety Appliance Company on the San Antonio sub-division of the Houston division of the Galveston, Harrisburg & San Antonio, now operated under lease by the Texas & New Orleans (Southern Pacific), 119.9 miles of single track.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS reports that for the year 1927, and thus far in 1928, the 216 men employed in the freight yards of the company at Chattanooga, have had to report no accident to the Interstate Commerce Commission; and during this period of about 390 days, these men have handled more than 820,000 cars. The N. C. & St. L. has been conducting education in safety since 1914, and has made numerous fine records. During the year 1927, there was only one fatality among its 10,000 employees.

THE SOUTHERN RAILWAY has announced its intention of transferring to Atlanta, Ga., about 1200, or more than one-half, of the employees now located at its general offices in Washington, D. C., while the Washington offices will be moved to a new building at Fifteenth and K streets. This is because the government has authorized the purchase of the general office building in which the company has been located for many years, and the ground on which it is situated, for use in connection with an extensive public buildings program which has been prepared and approved.

Southwest M. C. B. to Meet At Tulsa

The third semi-annual meeting of the Southwest Master Car Builders' and Supervisors' Association, and its auxiliary, the Southwest Railway Supplymen's Association will be held at the Mayo Hotel, Tulsa, Okla., on March 16 and 17. The program includes the presentation and discussion of committee reports, and papers covering many phases of car department operation. Officers for the ensuing year will be elected.

P. R. R. to Stimulate Safety

President W. W. Atterbury of the Pennsylvania announces that, to stimulate competition among employees of the different regions of the company's system in avoiding accidents to themselves or their fellows, he is to award five trophies to the departments in each region, which make the best record for 1928. The trophies are now being prepared by artists and will be awarded quarterly, to winning departments, for temporary custody. The management hopes to record, for 1928, not more than ten injuries to employees per million man-hours worked. If this degree of safety is reached, the injuries will have aggregated a third less, per million man-hours, than heretofore; and 50 per cent less than the record for all Class I railroads in the country, in 1927.

New York Railroad Club Meeting

The March 16 meeting of the New York Railroad Club will be "American Car & Foundry Co.'s Night," the subject, "In the Service of Transportation," to be discussed by Hector Fuller of that company. The meeting will be held, as usual, in the Engineering Societies building, New York; time 8:15 p. m. The "dutch treat" dinner will be held at Friedlander's Restaurant, 56 West Thirty-ninth street at 6 p. m.

Discuss Taking Over Express Business

The Mail and Express Committee of the Association of Railway Executives met in New York on March 5 to discuss further the proposal that the railroads handling express business under uniform contract with the American Railway Express Company themselves take over the company or its activities at the expiration of the contract next year. Progress was made in the discussion and the general attitude, as announced some weeks ago, appears to be favorable to some such action. No definite plans have as yet been made, however, nor has a decision been reached as to the method of acquiring the property of the express company in the event that the railroads do decide to take it over. This can be done either by purchase of capital stock or by taking over the assets at cost less depreciation.

The committee will meet again in five or six weeks for further discussion.

Senate Committee Votes Against Confirmation of Commissioner Esch

The Senate committee on interstate commerce on March 6 voted, ten to seven, to report unfavorably to the Senate on the question of the confirmation of Commissioner John J. Esch for reappointment to the Interstate Commerce Commission. On motion of Senator Bruce, of Maryland, the vote in the committee was made public. Those who voted in favor of confirmation were Senators Gooding, Couzens, Fess, Howell, du Pont, Bruce and Watson, all Republicans except Senator Bruce. Those who voted against confirmation were: Senators Goff, Pine, Sackett, Metcalf, Pittman, Dill, Wheeler, Mayfield, Black and Wagner, all Democrats except Goff, of West Virginia, and Sackett, of Kentucky, who have been opposing Mr. Esch because of his vote in the lake cargo coal rate case, and Pine of Oklahoma and Metcalf of Rhode Island.

The committee devoted an executive session on March 5 to discussion of the case, following the hearings held February 18 to 24, and voted as soon as it met on March 6.

A bill to provide that the term of office of commissioners of the Interstate Commerce Commission hereafter shall be eight years, instead of seven as at present, and that no person shall be eligible for a second appointment, was introduced in the

(*Continued on page 601*)

Revenues and Expenses of Railways

MONTH OF JANUARY OF CALENDAR YEAR 1928

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1927.
Akron, Canton & Youngstown	Jan.	171	$225,867	$274	$238,468	$34,863	$27,564	$13,350	$75,187	$14,868	$165,515	69.4	$72,953	$59,379	$34,454	$42,421
Atchison, Topeka & Santa Fe	Jan.	9,423	10,421,738	3,120,023	14,777,171	1,962,956	3,393,490	456,364	4,916,409	401,888	11,126,082	75.3	3,651,089	2,417,665	2,447,711	3,469,720
Gulf, Colorado & Santa Fe	Jan.	1,944	1,750,950	208,024	2,074,705	411,611	504,442	60,574	771,774	69,002	1,813,523	87.4	261,182	169,061	26,648	766,546
Panhandle & Santa Fe	Jan.	964	763,480	122,397	944,588	131,247	232,852	12,248	315,935	27,549	718,506	76.1	226,082	193,010	109,168	301,374
Atlanta & West Point	Jan.	93	159,202	65,909	255,209	27,109	45,718	13,416	83,712	12,170	187,168	73.3	68,041	52,705	37,855	34,478
Western of Alabama	Jan.	133	171,945	63,513	260,215	26,789	51,813	13,703	73,463	14,692	184,674	71.0	75,541	58,650	104,939	42,317
Atlanta, Birmingham & Coast	Jan.	639	335,030	28,295	400,210	90,516	84,911	32,381	168,239	18,938	406,452	101.5	—6,242	—21,324	—34,798	—15,751
Atlantic Coast Line	Jan.	5,104	4,462,258	1,569,164	6,520,876	949,254	1,311,784	235,353	2,383,903	187,104	5,139,659	77.3	1,381,217	879,891	836,728	1,298,771
Charleston & Western Carolina	Jan.	342	239,882	13,252	261,126	46,224	44,752	7,260	105,969	7,031	211,230	80.9	49,896	28,308	35,175	12,778
Baltimore & Ohio	Jan.	5,637	14,554,341	2,028,178	17,649,369	2,375,590	3,998,167	469,623	6,888,918	679,029	14,598,303	82.7	3,051,066	2,116,079	1,907,124	2,881,805
Baltimore & Ohio Chicago Terminal	Jan.	75	.....	.....	323,769	22,941	39,513	2,447	192,235	15,995	279,395	86.3	44,374	—8,223	59,749	57,601
Staten Island Rapid Transit	Jan.	23	98,599	112,059	231,127	27,693	23,306	2,004	107,185	15,653	175,841	76.1	55,286	37,786	1,289	—7,384
Bangor & Aroostook	Jan.	613	606,162	76,201	706,267	116,200	116,795	5,086	183,655	23,913	448,258	63.5	258,009	198,437	215,427	277,673
Belt Ry. Co. of Chicago	Jan.	32	.....	.....	603,341	41,740	79,561	3,529	318,519	10,592	453,941	75.2	149,400	101,684	142,089	140,686
Bessemer & Lake Erie	Jan.	227	601,553	11,647	626,219	61,677	287,694	15,467	244,537	36,374	649,228	103.7	—23,009	—46,715	—27,964	150,176
Bingham & Garfield	Jan.	33	37,849	.....	38,779	5,223	8,563	1,708	10,888	4,108	30,655	79.0	8,124	350	17,473	17,712
Boston & Maine	Jan.	2,112	3,758,253	1,452,813	5,912,834	678,337	1,151,499	74,322	2,431,491	218,015	4,567,107	77.2	1,345,727	1,034,613	803,486	655,430
Brooklyn Eastern Dist. Terminal	Jan.	9	116,234	.....	120,397	6,250	10,402	784	44,594	10,983	73,013	60.6	47,384	40,173	40,173	36,226
Buffalo & Susquehanna	Jan.	253	129,885	1,660	137,764	26,514	44,329	1,811	47,650	7,846	128,150	93.0	9,614	7,614	20,793	10,626
Buffalo, Rochester & Pittsburgh	Jan.	601	1,261,438	88,629	1,386,110	131,316	375,899	28,858	554,913	41,877	1,135,061	81.9	251,049	221,042	230,100	251,078
Canadian Pacific Lines in Maine	Jan.	233	257,305	31,119	303,336	23,646	44,696	5,619	123,368	3,785	201,114	66.3	102,222	88,222	63,999	49,918
Canadian Pacific Lines in Vermont	Jan.	85	105,253	39,147	162,128	47,637	37,260	1,652	103,254	1,796	191,599	118.2	—29,471	—34,321	—66,677	10,688
Central of Georgia	Jan.	1,911	1,469,873	349,333	2,019,409	263,028	363,153	73,806	812,869	96,585	1,623,601	80.4	395,808	274,860	285,029	383,573
Central New Jersey	Jan.	690	3,238,007	670,443	4,173,890	376,405	1,043,454	44,310	1,781,980	131,311	3,401,902	81.5	771,988	619,653	469,028	370,684
Central Vermont	Jan.		Not yet filed.													
Chesapeake & Ohio	Jan.	2,716	8,940,666	616,456	9,921,300	1,421,591	2,424,958	140,164	2,904,600	276,048	7,197,248	72.5	2,724,052	2,054,553	2,222,628	2,739,511
Chicago & Alton	Jan.	1,029	1,524,108	501,045	2,236,059	234,898	591,078	76,670	918,330	94,479	1,936,892	86.6	299,167	193,603	—10,262	256,072
Chicago & Eastern Illinois	Jan.	945	1,524,524	329,421	2,001,167	245,167	479,091	83,206	871,136	73,703	1,762,027	88.0	239,140	124,009	—4,470	226,792
Chicago & Illinois Midland	Jan.	133	201,543	10,671	216,524	15,020	45,233	13,640	66,890	14,758	155,549	71.8	60,975	53,540	53,774	61,814
Chicago & North Western	Jan.	8,463	7,353,018	1,975,099	10,422,302	1,173,013	2,214,697	203,152	4,664,340	366,564	8,684,625	83.3	1,737,677	960,916	887,328	550,850
Chicago, Burlington & Quincy	Jan.	9,377	9,811,160	1,699,038	12,652,136	1,241,836	2,185,095	241,631	4,631,578	372,165	8,784,451	69.4	3,867,685	3,008,401	2,678,357	1,906,757
Chicago Great Western	Jan.	1,495	1,395,030	266,980	1,805,367	180,697	388,974	79,601	859,109	55,436	1,575,085	87.2	230,282	146,601	—12,582	75,533
Chicago, Indianapolis & Louisville	Jan.	647	1,078,110	195,410	1,404,856	126,457	317,149	38,418	567,776	39,382	1,104,782	78.6	300,074	235,371	115,923	123,311
* Chicago, Milwaukee, St. Paul & Pac.	Jan.	11,252	9,217,210	1,582,013	11,967,611	1,247,018	2,680,213	288,979	5,149,515	361,170	9,811,811	81.9	2,155,800	1,403,482	972,402	518,207
Chicago River & Indiana	Jan.	20	.....	.....	551,995	49,172	72,637	827	214,855	19,531	357,022	64.7	194,973	149,103	246,968	251,939
Chicago, Rock Island & Pacific	Jan.	7,569	7,489,626	1,718,768	10,095,499	1,332,142	2,060,605	233,778	3,999,925	330,267	7,964,262	78.9	2,131,237	1,509,971	1,092,806	977,653
Chicago, Rock Island & Gulf	Jan.	516	409,204	70,969	512,697	44,429	52,696	19,123	200,068	16,666	310,351	60.5	202,346	178,576	147,159	221,068
Chic., St. Paul, Minn. & Omaha	Jan.	1,746	1,580,023	368,662	2,104,837	269,787	447,038	39,997	1,048,472	76,275	1,888,765	89.7	216,072	106,648	48,574	58,958
Clinchfield Railroad	Jan.	309	548,283	19,572	580,892	56,830	124,708	23,369	130,823	18,009	353,946	60.9	226,946	151,902	229,876	306,634
Colorado & Southern	Jan.	1,052	916,094	94,140	1,083,982	138,696	205,202	12,468	384,379	41,733	788,805	72.8	295,177	231,848	182,763	200,075
Ft. Worth & Denver City	Jan.	533	719,987	169,976	943,494	109,653	118,703	16,875	289,590	38,897	578,340	61.3	365,154	306,611	299,513	404,744
Wichita Valley	Jan.	271	134,427	14,246	155,820	22,210	9,269	17	44,759	1,822	78,020	50.1	77,800	68,039	40,858	80,530
Columbus & Greenville	Jan.	167	118,814	23,852	150,432	35,105	17,358	4,728	55,271	17,487	129,948	86.4	20,484	19,280	6,633	2,374
Conemaugh & Black Lick	Jan.	23	50,864	.....	110,117	12,262	25,534	961	75,685	3,027	117,469	106.7	—7,352	—8,352	—9,047	—12,926
Delaware & Hudson	Jan.	881	2,394,462	299,499	2,931,137	493,773	851,993	50,127	1,206,041	191,978	2,805,270	95.7	125,867	36,837	19,909	136,866
Delaware, Lackawanna & Western	Jan.	998	4,402,640	1,001,981	6,102,606	604,407	1,139,110	128,393	2,643,385	181,802	4,753,196	77.9	1,349,416	837,186	859,546	541,082
Denver & Rio Grande Western	Jan.	2,547	2,268,725	255,301	2,684,736	421,608	530,225	57,225	840 839	88,192	1,964,188	73.2	720,548	535,534	607,349	615,825
Denver & Salt Lake	Jan.	255	425,285	27,033	466,072	52,891	105,546	1,552	116,005	9,381	285,375	61.2	180,697	173,695	167,299	74,520
Detroit & Mackinac	Jan.	315	76,495	15,832	99,638	15,832	27,283	1,777	42,704	5,600	93,176	93.5	6,462	—3,503	333	—8,991
Detroit & Toledo Shore Line	Jan.	50	373,916	.....	377,952	21,449	33,525	3,476	97,168	7,449	163,067	43.1	214,885	185,735	105,556	141,765
Detroit Terminal	Jan.	19	.....	.....	140,281	21,829	14,446	.....	70,312	3,172	109,759	78.2	30,522	16,906	17,368	10,728
Detroit, Toledo & Ironton	Jan.	495	681,545	3,906	699,535	115,009	142,164	12,660	261,104	30,360	560,772	80.2	138,763	90,532	24,106	140,454
Duluth & Iron Range	Jan.	275	72,981	5,893	90,831	54,702	97,310	1,581	92,427	18,523	264,543	291.2	—173,712	—193,229	—195 363	—212,719
Duluth, Missabe & Northern	Jan.	307	69,573	5,892	80,563	73,868	155,457	3,381	130,442	22,786	385,934	479.0	—305,371	—381,887	—386,414	—462,747
Duluth, Winnipeg & Pacific	Jan.	178	208,672	11,663	224,656	25,360	48,076	4,664	86,628	8,254	173,992	77.4	50,664	39,405	37,764	51,833
Elgin, Joliet & Eastern	Jan.	460	1,716,189	21	1,896,305	166,036	398,297	14,781	732,449	52,661	1,362,984	71.9	533,321	450,174	278,731	356,750
Erie Railroad	Jan.	2,047	6,446,475	876,668	7,957,993	874,851	2,044,244	170,403	3,527,352	289,080	6,955,400	87.4	1,002,593	624,972	539,445	310,177
Chicago & Erie	Jan.	269	886,341	41,985	997,147	141,698	160,564	24,709	387,563	40,745	755,261	75.7	241,886	190,236	—117,490	—72,587
New Jersey & New York	Jan.	45	25,702	94,825	124,141	15,194	30,743	1,523	71,685	3,485	122,630	98.8	1,511	—2,391	—35,974	—40,016
N. Y., Susquehanna & Western	Jan.	134	279,569	44,745	370,963	49,164	65,187	5,274	203,322	11,005	333,916	90.0	37,047	7,695	—26,272	—23,632

* Includes operations of Chicago, Milwaukee & St. Paul for the period January 1 to 13th.

Includes operations of Chicago, Milwaukee & St. Paul for the period January 1 to 13th.

Revenues and Expenses of Railways

MONTH OF JANUARY OF CALENDAR YEAR 1928—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1927.
Evansville, Indianap. & Terre Haute	Jan.	146	$165,835	$4,288	$175,451	$21,809	$25,816	$2,387	$66,608	$6,022	$122,610	69.9	$52,841	$46,761	$13,230	$18,501
Florida East Coast	Jan.	858	723,096	546,169	1,420,794	205,074	203,788	62,099	485,258	55,890	1,046,876	73.7	373,918	225,924	150,439	132,891
Fort Smith & Western	Jan.	249	106,701	11,404	126,876	20,266	31,779	5,762	45,861	7,073	110,392	87.0	16,484	10,973	1,818	11,325
Galveston Wharf	Jan.	13	.....	.....	134,914	47,589	4,080	2,567	25,237	5,527	94,618	70.1	40,296	23,296	23,336	71,756
Georgia R. R.	Jan.	328	313,079	61,260	400,690	37,144	82,203	25,416	191,535	24,225	358,139	89.4	42,551	33,971	49,628	67,912
Georgia & Florida	Jan.	445	91,848	11,787	110,817	16,882	18,643	9,135	50,715	8,265	103,861	93.7	6,956	—1,056	1,865	16,923
Grand Trunk Western	Jan.	345	1,311,691	169,801	1,565,191	133,121	377,371	41,945	594,503	68,083	1,231,778	78.7	333,413	251,013	216,454	188,337
Atlantic & St. Lawrence	Jan.	166	216,794	36,242	277,609	34,912	51,330	5,659	168,520	9,365	270,942	97.6	6,667	—6,283	—77,609	—49,221
Chic., Det. & Canada Gr. Tr. Jct.	Jan.	59	254,576	1,119	290,471	15,116	16,671	4,779	93,359	4,650	134,561	46.3	155,910	145,510	104,793	172,521
Detroit, Grand Haven & Mil.	Jan.	192	522,323	26,708	591,486	47,362	62,752	13,370	258,042	20,388	401,830	67.9	189,656	178,756	43,681	91,356
Great Northern	Jan.	8,163	5,241,496	1,021,470	6,941,786	815,215	1,553,985	193,615	2,985,469	238,811	5,861,899	84.4	1,079,887	418,963	376,601	302,279
Green Bay & Western	Jan.	234	117,927	6,717	130,103	18,060	17,919	4,737	54,262	3,271	98,249	75.5	31,854	23,854	19,139	20,531
Gulf & Ship Island	Jan.	307	217,992	41,533	285,450	73,332	48,233	5,620	109,916	8,227	248,703	87.1	36,747	10,430	1,508	—41,311
Gulf, Mobile & Northern	Jan.	733	508,307	34,890	567,404	89,841	93,026	32,365	186,095	28,787	430,363	75.85	137,041	105,865	71,931	101,077
Hocking Valley	Jan.	348	1,110,377	65,661	1,254,907	169,359	318,378	18,606	431,170	44,177	981,614	78.2	273,293	148,315	181,425	217,507
Illinois Central	Jan.	4,915	9,457,125	2,098,686	12,306,226	1,377,019	2,806,919	291,080	4,789,059	356,854	9,704,686	78.9	2,601,540	1,759,623	1,868,474	1,963,658
Yazoo & Mississippi Valley	Jan.	1,708	1,720,792	325,533	2,176,032	388,666	373,868	42,956	894,376	64,036	1,763,638	81.0	412,394	246,817	183,837	278,904
Illinois Central System	Jan.	6,624	11,188,318	2,428,660	14,497,102	1,765,685	3,185,245	334,036	5,697,020	420,932	11,486,409	79.2	3,010,693	1,998,241	2,057,062	2,250,980
Kansas City, Mexico & Orient	Jan.	272	234,135	5,404	247,653	55,256	53,885	7,741	85,784	9,048	211,645	85.5	36,008	31,953	48,131	—12,039
Kansas City, Mex. & Orient of Tex.	Jan.	465	464,161	16,680	494,690	125,913	97,369	8,487	159,795	10,305	402,115	81.3	92,575	85,148	21,192	36,775
Kansas City Southern	Jan.	784	1,185,003	86,007	1,408,105	156,108	256,421	54,796	484,980	79,325	1,031,753	73.3	376,352	262,277	211,604	299,007
Texarkana & Ft. Smith	Jan.	81	198,391	7,537	221,773	17,899	13,961	5,777	64,803	9,624	112,638	50.8	109,135	96,965	64,575	43,860
Kansas, Oklahoma & Gulf	Jan.	326	235,910	3,898	245,341	54,932	22,597	10,328	68,172	9,522	159,002	64.8	86,339	75,709	62,199	—56,068
Lake Superior & Ishpeming	Jan.	160	65,660	2,644	72,164	26,539	26,931	669	34,636	6,660	95,435	132.2	—23,271	—35,626	—40,224	—45,586
Lake Terminal	Jan.	13	.....	.....	73,905	14,816	18,520	.....	49,743	2,515	85,594	115.8	—11,689	—16,214	—11,929	—11,094
Lehigh & Hudson River	Jan.	96	208,918	1,710	221,838	25,347	42,758	2,460	88,577	9,772	168,914	76.1	52,924	40,974	18,438	36,376
Lehigh & New England	Jan.	216	337,939	1,645	345,550	35,467	91,023	5,771	183,918	18,438	334,456	96.8	11,094	4,170	7,308	78,411
Lehigh Valley	Jan.	1,363	4,168,398	566,616	5,120,139	778,548	1,362,704	135,152	2,501,040	140,283	4,949,717	96.7	170,442	22,321	—152,484	158,895
Louisiana & Arkansas	Jan.	302	260,861	10,542	276,653	39,041	55,253	11,265	80,378	10,950	195,732	70.8	80,921	54,692	45,898	21,567
Louisiana Ry. & Nav. Co.	Jan.	337	251,636	9,608	271,627	64,602	37,510	12,259	121,985	10,881	245,209	90.3	26,418	3,406	—31,450	—33,723
Louisiana Ry. & Nav. Co. of Tex.	Jan.	206	78,891	4,297	86,273	21,878	9,934	1,726	42,227	5,089	80,854	93.7	5,419	1,383	—11,941	—24,146
Louisville & Nashville	Jan	5,069	8,910,288	1,594,584	11,141,015	1,600,740	2,608,809	335,611	4,130,403	344,428	9,058,962	81.3	2,082,053	1,495,098	1,503,049	1,572,030
Louisville, Henderson & St. Louis	Jan.	199	239,752	44,707	301,577	51,732	55,703	8,117	114,181	11,395	243,087	80.6	58,490	36,087	27,597	77,269
Maine Central	Jan.	1,122	1,203,231	280,315	1,606,041	221,519	296,608	12,974	680,274	54,430	1,265,576	78.8	340,465	235,540	183,703	264,161
Midland Valley	Jan.	364	257,284	19,140	287,835	34,666	31,868	7,518	79,910	13,519	165,293	57.4	122,542	105,148	76,657	115,264
Minneapolis & St. Louis	Jan.	1,627	885,630	87,312	1,030,056	109,445	241,099	38,196	567,083	45,724	1,001,429	97.2	28,627	—32,895	—94,110	—83,598
Minneapolis, St. Paul & S. S. Marie	Jan.	4,385	2,607,525	468,360	3,304,385	458,211	710,554	81,199	1,498,605	115,374	2,874,531	87.0	429,854	213,990	91,213	108,212
Duluth, South Shore & Atlantic	Jan.	582	307,278	76,099	408,936	46,723	71,361	9,965	181,891	11,570	326,201	79.8	82,735	52,735	32,221	15,290
Spokane International	Jan.	165	73,887	10,864	91,549	17,379	9,397	3,433	35,275	6,520	73,105	79.9	18,444	12,971	6,875	15,906
Mississippi Central	Jan.	161	112,505	8,082	125,579	15,084	22,584	9,012	36,298	8,377	91,355	72.7	34,224	26,661	25,708	33,136
Missouri & North Arkansas	Jan.	364	102,779	12,766	123,074	33,346	25,784	9,555	61,639	8,530	138,854	112.8	—15,780	—18,140	—29,632	—3,063
Missouri-Kansas-Texas	Jan.	1,799	2,101,453	334,051	2,627,092	264,565	595,929	69,503	757,769	98,793	1,796,198	68.4	830,894	645,165	630,890	746,910
Missouri-Kansas-Texas of Texas	Jan.	1,389	1,133,109	306,518	1,572,543	212,022	258,695	50,680	673,494	65,159	1,275,283	81.1	297,260	242,670	101,619	278,930
Missouri Pacific	Jan.	7,396	8,128,522	1,228,693	10,138,598	1,289,028	2,049,135	287,108	3,998,907	385,795	7,975,320	78.7	2,163,278	1,733,318	1,362,180	1,522,101
Gulf Coast Lines	Jan.	1,007	958,271	148,258	1,166,847	222,805	210,277	39,319	391,998	55,440	924,138	79.2	242,709	192,113	130,414	245,945
International-Great Northern	Jan.	1,159	1,045,193	200,734	1,357,597	231,908	268,104	36,812	615,803	65,703	1,214,423	89.48	142,774	101,894	41,675	160,850
San Antonio, Uvalde & Gulf	Jan.	318	109,494	18,746	139,572	31,088	20,472	5,180	46,774	7,465	111,969	80.2	27,603	23,867	2,498	6,210
Texas & Pacific	Jan.	2,014	2,890,373	511,929	3,610,126	516,063	666,676	75,289	1,283,698	107,285	2,653,998	73.5	956,128	797,887	541,126	354,109
Mobile & Ohio	Jan.	1,161	1,160,396	103,515	1,336,294	205,090	268,738	51,160	529,223	48,038	1,100,465	82.4	235,829	152,309	97,384	157,557
Monongahela	Jan.	171	568,518	20,408	594,598	85,000	82,000	1,159	162,814	10,400	341,373	57.4	253,225	231,907	136,864	221,637
Monongahela Connecting	Jan.	7	.....	.....	153,532	15,202	32,952	415	73,957	3,271	125,797	81.9	27,735	20,322	21,313	26,405
Montour	Jan.	56	113,535	5	114,174	11,293	36,639	1,337	34,674	6,960	90,903	79.6	23,271	21,771	39,443	53,598
Nashville, Chattanooga & St. Louis	Jan.	1,259	1,238,404	315,320	1,686,432	247,100	434,282	98,685	671,922	78,553	1,543,915	91.5	142,517	67,495	81,712	221,439
Nevada Northern	Jan.	165	61,890	5,390	73,944	13,541	10,265	1,000	15,421	4,412	44,942	60.8	29,002	18,292	18,976	32,367
Newburgh & South Shore	Jan.	6	.....	.....	98,697	8,631	35,516	.....	59,596	4,268	108,011	109.4	—9,314	—20,524	—15,865	4,161
New Orleans Great Northern	Jan.	276	251,508	19,721	280,482	33,345	38,363	13,342	87,034	11,394	183,821	65.5	96,661	76,100	59,236	45,099
New Orleans Terminal	Jan.	20	2,490	.....	131,261	30,729	9,212	.....	56,453	1,702	98,096	74.7	33,165	22,161	17,709	27,011
New York Central	Jan.	6,925	16,837,613	8,227,236	28,663,798	3,520,916	5,956,639	449,613	11,133,620	1,175,516	22,722,642	79.3	5,941,156	3,892,501	3,629,575	3,768,363
Cincinnati Northern	Jan.	244	304,459	5,209	314,564	38,712	72,451	6,314	120,227	9,521	247,225	78.6	67,339	50,318	4,177	38,303
Cleve., Cinn., Chicago & St. Louis	Jan.	2,396	5,203,430	1,327,854	7,071,780	688,184	1,624,823	161,840	2,871,188	290,181	5,720,024	80.9	1,351,756	969,085	769,288	893,303
Indiana Harbor Belt	Jan.	130	.....	.....	935,592	108,922	114,100	5,507	446,630	27,748	716,068	76.5	219,524	173,672	137,077	61,624
Michigan Central	Jan.	1,858	4,559,463	1,739,280	6,913,668	729,935	1,308,035	138,794	2,441,961	252,102	4,980,792	72.0	1,932,876	1,470,849	1,375,523	1,269,213
Pittsburgh & Lake Erie	Jan.	231	2,009,057	215,478	2,298,481	302,637	761,092	29,554	846,210	76,729	2,018,691	87.8	279,790	127,789	433,559	616,521
New York, Chicago & St. Louis	Jan.	1,690	4,018,933	119,492	4,248,793	443,578	814,985	141,153	1,585,209	158,583	3,140,341	73.9	1,108,452	832,029	570,425	464,842

Revenues and Expenses of Railways

MONTH OF JANUARY OF CALENDAR YEAR 1928—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income. 1927.
N. Y., New Haven & Hartford	Jan.	2,167	$5,258,748	$3,914,338	$10,301,119	$1,534,468	$1,990,996	$100,911	$3,772,044	$307,093	$7,880,847	76.5	$2,420,272	$1,799,366	$1,318,239	$796,907
New York Connecting	Jan.	20	214,725	.....	240,102	20,348	22,808	.....	45,827	1,571	90,554	37.7	149,548	110,048	87,328	80,227
New York, Ontario & Western	Jan.	569	541,806	73,449	780,374	106,412	169,819	18,773	441,604	39,666	784,596	100.5	—4,222	—54,443	—100,515	—207,999
Norfolk & Western	Jan.	2,241	7,019,345	524,357	7,856,685	1,217,718	1,584,442	117,650	2,233,323	272,105	5,438,114	69.2	2,418,571	1,618,089	1,784,583	2,364,657
Norfolk Southern	Jan.	931	610,491	45,539	702,734	86,854	110,456	26,282	272,910	30,684	521,468	74.2	181,266	132,399	110,733	113,923
Northern Pacific	Jan.	6,708	4,950,705	920,680	6,457,622	703,294	1,469,967	237,966	2,730,072	259,895	5,482,323	84.9	975,299	307,620	685,535	343,555
Northwestern Pacific	Jan.	477	220,448	114,891	377,344	96,521	81,464	8,499	230,069	21,459	437,949	116.1	—60,605	—101,305	—106,403	—48,953
Pennsylvania R. R.	Jan.	10,513	32,161,807	11,688,364	48,088,784	5,779,519	10,797,501	825,057	19,045,471	1,574,161	38,706,496	80.5	9,382,288	7,331,136	6,249,647	4,633,136
Baltimore, Chesapeake & Atlantic	Jan.	130	48,398	17,369	71,896	8,407	14,762	1,281	71,235	3,044	98,729	137.3	—26,833	—26,836	—28,012	—32,991
Long Island	Jan.	403	827,013	1,909,706	2,919,610	392,270	716,074	19,911	1,326,063	90,112	2,548,521	87.3	371,089	310,974	176,101	154,831
West Jersey & Seashore	Jan.	378	331,705	309,706	672,713	119,604	124,090	14,045	409,926	25,130	693,074	103.0	—20,361	—20,380	—46,772	—33,440
Peoria & Pekin Union	Jan.	19	20,083	2,293	162,953	10,294	10,656	2,651	76,432	8,143	108,176	66.4	54,777	37,777	63,035	35,942
Pere Marquette	Jan.	2,244	2,478,961	256,596	2,901,514	238,656	731,897	61,907	1,173,833	123,112	2,339,194	80.6	562,320	362,211	245,749	340,273
Pittsburgh & Shawmut	Jan	102	191,650	5,993	199,197	16,562	39,105	2,013	53,625	6,775	118,080	59.3	81,117	79,938	71,125	32,542
Pittsburgh & West Virginia	Jan.	92	278,152	6,188	316,251	20,312	69,269	11,729	65,781	21,233	198,412	62.7	117,839	74,292	137,988	242,892
Pittsburgh, Shawmut & Northern	Jan.	198	148,971	2,392	153,724	30,586	31,482	1,569	53,812	5,677	123,126	80.1	30,598	27,607	20,617	17,949
Quincy, Omaha & Kansas City	Jan.	249	44,514	11,615	62,120	18,336	10,638	746	30,111	2,852	62,580	100.7	—460	—5,287	—7,778	—33,539
Reading	Jan.	1,136	5,875,289	742,592	6,937,829	842,013	1,896,729	84,393	2,808,430	202,763	5,846,626	84.3	1,091,203	731,359	822,984	1,352,158
Atlantic City	Jan.	161	113,193	85,197	212,747	86,879	28,889	10,279	206,713	6,274	341,715	160.6	—128,968	—166,318	—194,578	—187,074
Perkiomen	Jan.	41	90,882	3,017	96,999	9,009	5,395	106	47,473	1,291	63,332	65.3	33,667	26,220	19,610	29,509
Port Reading	Jan.	19	152,913	.....	197,065	17,184	6,334	229	73,079	5,978	102,804	52.2	94,261	79,249	13,590	—2,444
Richmond, Fredericksburg & Potomac	Jan.	117	372,355	406,617	935,804	95,587	174,041	10,762	348,533	38,210	694,729	74.2	241,075	192,571	118,133	143,332
Rutland	Jan.	413	278,728	199,898	538,082	95,914	105,211	13,656	225,869	13,393	456,078	84.8	82,004	57,524	52,020	41,478
St. Louis-San Francisco	Jan.	5,042	4,981,812	1,010,447	6,419,134	790,940	1,338,071	117,345	2,278,476	238,096	4,706,469	73.3	1,712,665	1,374,155	1,404,814	1,624,619
Ft. Worth & Rio Grande	Jan.	233	80,798	13,537	105,889	14,712	21,115	3,333	52,700	5,431	97,266	91.9	8,623	4,488	—4,527	11,414
St. Louis, San Francisco & Texas	Jan.	137	120,856	11,904	137,115	15,350	25,221	4,792	53,554	7,073	105,928	77.3	31,187	28,522	6,278	19,374
St. Louis Southwestern	Jan.	940	1,314,630	95,630	1,478,419	154,193	213,514	65,701	411,355	63,967	916,878	62.0	561,541	492,121	390,447	345,960
St. Louis Southwestern of Texas	Jan.	807	501,425	48,369	594,250	192,354	120,292	29,653	260,621	33,355	639,494	107.6	—45,244	—72,995	—36,711	18,734
San Diego & Arizona	Jan.	156	71,163	26,026	101,669	17,748	16,917	4,547	31,750	8,902	81,242	79.9	20,427	14,763	15,650	41,723
Seaboard Air Line	—Jan.	4,499	3,643,525	1,083,783	5,183,481	660,623	879,482	216,233	2,008,546	194,400	4,057,955	78.3	1,125,526	800,276	669,058	819,627
Southern Ry.	Jan.	6,772	8,148,492	2,161,322	11,158,584	1,691,525	2,136,466	240,880	4,023,877	340,484	8,519,274	76.3	2,639,310	1,893,899	1,660,251	1,770,618
Alabama Great Southern	Jan.	314	561,172	149,615	760,376	134,247	152,313	22,198	259,344	23,079	598,289	78.7	162,087	109,424	135,456	159,903
Cinn., New Orleans & Tex. Pacific	Jan.	338	1,227,053	339,046	1,653,533	259,277	351,487	41,214	512,549	55,910	1,237,906	74.9	415,627	320,942	300,351	239,668
Georgia Southern & Florida	Jan.	401	213,786	153,763	399,015	81,558	82,274	9,947	160,462	11,104	353,837	88.7	45,178	23,938	25,779	7,938
New Orleans & Northeastern	Jan.	204	335,939	72,588	437,311	68,147	76,672	12,467	141,810	14,837	318,190	72.8	119,121	70,744	44,475	60,038
Northern Alabama	Jan.	110	75,816	7,123	85,169	25,800	4,721	1,803	33,086	2,750	68,057	79.9	17,112	10,657	—13,049	16,284
Southern Pacific	Jan.	8,920	10,742,950	3,117,473	15,280,059	2,114,220	2,907,337	437,485	5,503,560	665,635	11,908,453	77.9	3,371,606	2,108,008	1,897,808	1,893,604
So. Pacific Steamship Lines	Jan.	...	698,382	28,766	878,490	15,056	159,637	19,204	566,356	38,508	798,761	90.9	79,729	77,868	77,641	68,051
Texas & New Orleans	Jan.	4,602	3,905,616	918,599	5,239,765	1,055,555	1,194,884	175,215	2,088,475	261,402	4,779,538	91.2	460,227	175,607	—66,230	122,878
Spokane, Portland & Seattle	Jan.	554	432,762	95,811	592,314	67,191	99,144	10,760	213,998	22,020	414,426	69.9	177,888	94,150	88,649	88,718
Tennessee Central	Jan.	296	220,938	20,667	254,343	46,492	44,618	9,109	100,951	12,302	213,331	83.9	41,012	35,670	16,571	—23,948
Terminal Railroad Assn. of St. L.	Jan.	55	.....	.....	1,111,574	137,125	96,152	2,582	469,192	26,416	734,846	66.1	376,728	277,326	363,975	393,545
Texas Mexican	Jan.	162	55,717	4,230	65,359	16,207	17,244	3,732	37,195	6,331	80,709	123.5	—15,350	—20,359	—25,887	—11,476
Toledo, Peoria & Western	Jan.	239	123,795	3,851	134,366	26,947	16,214	10,111	55,797	8,264	117,333	87.3	17,033	14,983	3,385	—9,174
Toledo Terminal	Jan.	28	.....	.....	108,103	1,269	14,128	500	46,347	4,814	67,058	62.0	41,045	23,549	56,564	50,735
Trinity & Brazos Valley	Jan.	367	219,941	8,023	234,895	51,027	34,939	5,615	100,371	11,594	197,886	84.2	37,009	29,379	—1,417	—22,087
Ulster & Delaware	Jan.	128	20,725	3,856	52,913	12,558	15,013	1,362	37,110	4,949	70,992	134.1	—18,079	—23,829	—24,816	—25,676
Union Railroad of Penna.	Jan.	45	.....	.....	662,684	63,363	169,293	166	367,051	13,675	613,548	92.6	49,136	37,636	117,313	86,385
Union Pacific	Jan.	3,711	6,409,865	1,131,957	8,181,620	649,368	1,852,703	157,846	2,451,158	337,826	5,584,337	68.3	2,597,283	1,931,398	1,744,345	1,320,796
Oregon Short Line	Jan.	2,539	2,321,231	318,784	2,836,149	307,930	552,395	53,472	876,786	129,361	1,981,189	69.9	854,960	593,474	519,653	412,913
Oregon-Wash. R. R. & Nav. Co.	Jan.	2,343	1,548,475	290,094	2,059,813	335,748	417,213	73,986	909,163	129,862	1,907,250	92.6	152,563	—42,840	—172,046	—80,053
Los Angeles & Salt Lake	Jan.	1,209	1,418,104	322,204	1,914,340	310,572	406,396	70,296	679,062	81,193	1,634,420	85.4	279,920	144,763	43,821	113,339
St. Joseph & Grand Island	Jan.	258	272,737	12,770	301,949	32,982	38,361	3,279	108,959	16,433	200,014	66.2	101,935	79,619	64,901	32,432
Utah	Jan.	111	223,050	.....	223,763	44,372	44,908	387	48,663	6,530	144,860	64.7	78,903	64,861	47,807	73,985
Virginian	Jan.	545	1,566,859	42,201	1,701,067	161,007	328,557	15,742	357,889	36,525	898,361	52.8	802,706	642,699	687,784	1,040,465
Wabash	Jan.	2,524	4,246,313	626,744	5,231,107	566,753	976,828	161,798	2,200,054	180,890	4,107,944	78.5	1,123,163	869,473	571,067	544,721
Ann Arbor	Jan.	293	384,360	20,345	418,069	42,030	89,576	12,480	188,265	12,331	344,725	82.5	73,344	49,931	29,922	15,127
Western Maryland	Jan.	804	1,500,275	35,154	1,579,892	192,536	335,792	39,200	481,415	47,593	1,098,603	69.5	481,289	396,289	437,719	482,275
Western Pacific	Jan.	1,042	945,380	70,059	1,075,890	234,577	228,094	47,488	442,207	45,508	1,016,974	94.5	58,916	—38,873	33,268	123,194
Wheeling & Lake Erie	Jan.	511	1,123,775	27,187	1,224,529	131,212	312,980	32,439	429,378	45,882	953,437	77.9	271,092	160,077	161,954	226,007
Wichita Falls & Southern	Jan.	169	61,520	2,409	68,314	16,051	10,003	2,442	23,037	4,271	55,804	81.69	12,510	7,187	4,577	48,330

News of the Week

(*Continued from page 597*)

Senate on March 6 by Senator Neely, of West Virginia, as S. 3529.

Visible Evidence of the Invisible

"If you care to see the token carried by the conductor (the possession of which by him is assurance that the inductive automatic train control apparatus is functioning properly on his locomotive) ask him to show it to you." This is the salient point in a little leaflet which the Chicago & North Western gives to its passengers by way of impressing upon interested patrons the reality of the invisible force which is depended upon to stop the train in case the engineman, by reason of sudden fainting, or from other cause, should allow the train to run too near a danger point. The leaflet gives a brief description of the General Railway Signal Company's automatic train control, in use on that road between Chicago and Council Bluffs, with photographic illustrations of some of the apparatus. Conductors on this part of the road are never to start out their trains without first having received this token from the engineman. It consists of a key which cannot be taken out of its keyhole until the apparatus on the engine has been locked in operative position. In case of failure of the automatic train control apparatus, the key can be used, under proper restrictions, to cut it out of service. In such cases, arrangements are made for securing a relief locomotive as soon as possible.

Although, says the leaflet, the system is costing the Chicago & North Western three million dollars "not a penny has been added to your railroad fare nor to the cost of freight shipments."

Bill to Exempt Short Lines from Recapture Passed by Senate

The Pittman bill, providing that the recapture provisions of Section 15a of the interstate commerce act shall not apply to certain classes of short line railroads, was passed by the Senate by unanimous consent on March 6. The bill exempts lines of not exceeding 200 miles whose average annual operating revenues for three years have not exceeded $10,000 per mile; lines of not over 100 miles whose average operating revenues have not exceeded $15,000 a mile; and, to the extent to be determined by the Interstate Commerce Commission, railroads of not exceeding 200 miles which are deemed to have a probable limited service life.

An amendment proposed by Senator Metcalf of Rhode Island was also adopted exempting lines of not more than 5 miles whose average operating revenues for three years have not exceeded $100,000. In determining the extent to which carriers shall be relieved on account of probable limited service life the commission is directed to give consideration as to whether or not the major portion of the revenues are derived from mineral deposits, stands of timber oil fields, or other natural resources, it being declared to be the policy of Congress that such carriers shall be entitled to set aside out of their revenues each year such percentage as the commission may determine as a depletion account.

The Lackawanna Hack Stand Case

The Morristown (N. J.) railroad station hack-stand case, briefly noticed in the *Railway Age* of March 3, page 508, arose out of the attempt of the town to take undue advantage of a clause in a track-elevation contract, providing that the town "may and shall exercise all necessary police powers * * * for the purpose of regulating traffic." The case reached the Supreme Court apparently because the Circuit Court of Appeals (14 Fed—2d—257) ignored the long-settled principle that railroad station grounds are private property and that a railroad may grant exclusive privileges to a responsible cab owner.

The road sued in the federal district court to restrain the town from enforcing an ordinance establishing a public hack-stand in a driveway on the railroad's grounds. The court entered a decree for the railroad, but this was reversed by the Circuit Court of Appeals, Third Circuit. This decree has now been reversed and that of the district court affirmed. The clause concerning police powers is held not to empower the town so to appropriate the railroad's land. The elevation contract did not enlarge the powers of the town. It declared that "this contract shall not be construed as a dedication of said driveway as a public highway."

"Under the guise of regulation the town cannot require any part of the driveway to be used in a service that petitioner is under no duty to furnish. And, as petitioner's duty here involved is confined to the business of carrying passengers by railroad, the declaration of the town ordinance that the specified part of the driveway is designated and established as an additional public hack stand, clearly transcends the power of regulation. The case was decided February 20; opinion by Mr. Justice Butler. Mr. Justice Brandeis concurred in part in a separate opinion, in which Mr. Justice Holmes concurred.

Revenues and Expenses for January

The net railway operating income of the Class I railroads in January amounted to $57,070,898, which for that month was at the annual rate of 3.68 percent on their property investment, according to reports compiled by the Bureau of Railway Economics. In January, 1927, the net amounted to $61,383,597 or 4.06 percent.

Operating revenues amounted to $457,173,637, as compared with $486,926,520 in January, 1927, or a decrease of 6.1 percent. Operating expenses totaled $362,730,488, a decrease of 6.4 percent.

Class I railroads in January paid $28,514,890 in taxes, a decrease of approximately $950,000 or 3.2 per cent under the total for the same month last year.

Thirty-six Class I railroads operated at a loss in January, of which sixteen were in the eastern district, two in the southern and eighteen in the western.

The net railway operating income by districts in January, with the percentage of return based on property investment on an annual basis, was as follows:

New England Region	$ 2,579,916	5.80%
Great Lakes Region	9,133,084	3.64%
Central Eastern Region	11,824,741	3.87%
Pocahontas Region	4,813,128	5.95%
Total Eastern District	28,350,869	4.16%
Total Southern District	8,570,073	3.35%
Northwestern Region	2,592,530	1.54%
Central Western Region	12,077,804	4.36%
Southwestern Region	5,479,622	3.26%
Total Western District	20,149,956	3.28%
UNITED STATES	57,070,898	3.68%

The net railway operating income in the Eastern district in January was $28,350,869, at the rate of 4.16 percent, as compared with $30,328,426, or 4.57 percent, in January, 1927. Operating revenues totaled $225,255,825, a decrease of 8.5 percent, while operating expenses totaled $179,660,081, a decrease of 9.4 percent.

Class I railroads in the Southern district had a net railway operating income of $8,570,073 or 3.35 percent, as compared with $9,876,633, or 4.04 percent, in January, 1927. Operating revenues totaled $63,339,469, a decrease of 7.2 percent, while operating expenses totaled $50,101,049, a decrease of 6.2 percent.

Class I railroads in the Western district in January had a net railway operating income of $20,149,956, at the rate of 3.28 percent, as compared with $21,178,538, or 3.51 percent, in January, 1927. Operating revenues totaled $168,578,343, a decrease of 2.3 percent, while operating expenses totaled $132,969,358, a decrease of 2 percent.

CLASS I RAILROADS—UNITED STATES

	Month of January 1928	1927
Total operating revenues	$457,173,637	$486,926,520
Total operating expenses	362,730,488	387,396,129
Taxes	28,514,890	29,465,691
Net railway operating income	57,070,898	61,383,397
Operating ratio — percent	79.34	79.56
Rate of return on pro- income	57,070,898	61,383,597

Canadian Roads Have Good Month

An increase of $1,094,834 or 6.16 per cent. is shown in the gross earnings of the Canadian National Railways during January, 1928, as compared with the corresponding month of last year, according to the official summary of earnings and expenses. Gross earnings of the National System in January, 1928, excluding lines east of Levis and Diamond Junction and excluding Central Vermont lines, were $18,871,671 as against $17,776,836 in January, 1927.

During the month of January, 1928, operating expenses also showed an increase, the figures being $16,550,659 in January, 1926, against $15,544,735 in January, 1927, an increase of $1,005,924 or 6.47 per cent.

Net earnings during the first month of the present calendar year were $2,321,011 against $2,232,100 in January, 1927, an increase of $88,910 or 3.98 per cent.

The operating ratio in January, 1928, was 87.70 per cent. against 87.44 per cent. in January, 1927.

The new year has started auspiciously for the Canadian Pacific Railway which, in its statement of earnings and expenses for the month of January, 1928, shows net

substantially greater than for the corresponding month of 1927, in fact, greater than for any month of January since 1917. Gross earnings were also well ahead of those for any January of recent years.

The following table shows the earnings, expenses and net profits for the month with comparisons:

	January		
	1928	1927	Inc.
Gross	$15,320,285	$14,435,369	$884,916
Oper. ex.	13,442,249	12,925,134	517,114
Net	1,878,036	1,510,234	367,801

I. C. C. Examiner Recommends That Cab Curtains Be Required

The Interstate Commerce Commission has made public a proposed report by Special Examiner John L. Rogers recommending that the commission find that the safety of employees and travelers upon railroads requires that in certain territories in the northern part of the country steam locomotives and tenders have suitable cab curtains; that unnecessary or excessive openings about locomotive cabs be closed, during the winter months; that oil-burning locomotives do not take air into the firebox from the interior of the cab; and that steam locomotives used in road service have a suitable storm window attached to side cab windows.

The report was submitted in the case arising on a complaint filed by the Railroad Commission of Wisconsin in which the commissions of several other states and the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen intervened. Hearings have been held at various places. The report recommends that rule 116 of the rules and instructions for the inspection and testing of steam locomotives and tenders be amended by adding the requirements proposed, effective November 1, 1928. The proposed amendments provide that each locomotive used in Colorado, Connecticut, Delaware, District of Columbia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, Nevada, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming and part of California, except deckless locomotives and locomotives equipped with a vestibule cab, shall have suitable doors, or a suitable roll or slide back curtain of sufficient length and width to cover the opening in rear wall of cab. From November 1 to April 1 the locomotives not equipped with a vestibule cab are also required to have suitable side curtains, and in the states named except Maryland, Virginia, Kentucky, California and the District of Columbia to have cab hood curtains.

"It is only fair to state," the report says, "that several of the carriers have for a considerable period provided all the protective equipment covered by the proposed rules. Other carriers have provided the greater part of it. The principal effect of the proposed rules as to these carriers will be to secure better maintenance of the equipment so that it will best serve the purpose for which it is applied." It adds that the proposed rules should be regarded as minimum requirements which are not intended to take care of the most extreme conditions.

C. N. R. Debts Part of Public Debt?

A vigorous defence of the manner in which the Canadian Minister of Finance (James A. Robb) in his last budget, submitted to the House of Commons at Ottawa on February 16 and in preceding budgets treated the debt due by the Canadian National Railways to the public was made last week in the Canadian House by Charles A. Dunning, Minister of Railways and Canals, who said, in part, as follows:

"The change in the form of the estimates to provide that advances to the railways might be made in the form of cash or by way of guarantees, or partly in cash and partly by guarantees, in the discretion of the governor in council, was made for the first time in the fiscal year 1921-22 by the government of which my hon. friend was a supporter. The general form of that estimate and the general treatment of the matter has been continued, and very properly continued, I submit, by the present Minister of Finance (Mr. Robb).

I might also call attention for the benefit of my hon. friend from York-Sunbury (Mr. Hanson) to the fact that during the fiscal year 1921-1922, when the government of which he was a supporter, a Conservative government, was in power there were guaranteed loans for Canadian National railway account in March, July and September of that year, totalling $61,000,000, floated by the Conservative government, not one dollar of which was taken into account as increasing the net public debt, nor were the statutory guarantees of the same government in previous years.

H. A. Stewart (Leeds): "Would the minister allow me a question?"

Mr. Dunning: "Yes."

Mr. Stewart: "How much of that 1921 guarantee to which the minister refers was for refunding of existing obligations?"

Mr. Dunning: "I do not think I have the figures of refunding here but a large portion of the amount in any case was not for refunding, and if I follow my hon. friend from St. Lawrence-St. George correctly, he would not draw any distinction in his treatment whether it was for refunding or not. He would have it all charged to the net debt of Canada without any distinction whatsoever."

P. M. McGibbon: "The railway is paying the interest."

Mr. Dunning: "That indeed is the whole point. That portion of the debt of the Canadian National Railways which is owed to the government of Canada, and upon which the taxpayers of Canada as such are paying interest, is a part of the net public debt. That portion of the debt of the Canadian National Railways which is owed to the public and on which the railway is earning the interest, is not a part of the net debt of Canada, but is a charge against the railway."

Looking Out for Yourself in a Large Freight Yard

Some instructive details concerning the law applying to the case of an employee under circumstances where he is primarily responsible for looking out for his own bodily safety, are to be found in a decision which was handed down by the Supreme Court of the United States (Justice Butler) on February 20. A car checker sued the Toledo, St. Louis & Western under the Employers' Liability Act, for injuries sustained in the yard at Madison, Ill. Being struck by a car he claimed that the fault was the railroad's for failing to maintain an adequate space between the tracks, and failure of other employees to warn him. The Missouri Supreme Court affirmed a verdict for plaintiff but this is now reversed. The conditions in the yard were of the usual kind, with tracks 12 ft. apart, center to center. It was dark and there was no moon.

The court says that the work of checking cars in a yard at night is necessarily attended with much danger but "fault or negligence may not be inferred from the mere existence of danger or from the fact that plaintiff was struck and injured by the moving car * * * Courts will not prescribe the space to be maintained between tracks in switching yards, nor leave such engineering questions to the uncertain and varying opinions of juries.

The evidence when taken most favorably to plaintiff is not sufficient to warrant a finding that defendant failed in any duty owed him in respect of the space between the tracks. The court erred in submitting that question to the jury.

"The jury was authorized to find defendant negligent in failing to cause the engine bell to be rung and in sending the cars along Track 4 without a light and unattended * * * The decision on this point, says Justice Butler, is contrary to the rule followed in the federal courts. The ringing of bells and the sounding of whistles on trains going and coming, and switch engines moving forwards and backwards, would have simply tended to confusion. In the absence of proof that plaintiff was exposed to some unusual danger by reason of a departure from the practice generally followed, it cannot be held that defendant was in duty bound to give him warning. The dangers were obvious and must have been fully known and appreciated by plaintiff."

ANOTHER STEP in the electrification of the Indian Railways was marked by the opening on January 5 of the electrified suburban lines of the Bombay, Baroda & Central India, the ceremony being led by the Governor of Bombay, Sir Leslie Wilson. The district served by electric trains extends from Borivli in the north to Colaba in the south, a total of 57 track miles, and for the main part involves two lines only, local lines in either direction, although between Grant Road and Mahim stations, all four tracks have been equipped for electrical operation.

Traffic

The Chicago & Eastern Illinois will operate a Better Poultry train through 32 towns in Illinois from March 12 to 29.

The Interstate Commerce Commission has assigned Part 5 of its rate structure investigation, relating to rates on furniture, for hearing at Chicago on May 1, before Commissioner Lewis and Examiner Barclay.

Forty members of the "Seven O'Klockers Klub," the group of passengers who commute daily on the Reading and Jersey Central between Philadelphia and New York, celebrated the organization's first birthday at a special dinner on March 7 in the dining car of the 5 p. m. express as it pulled out of Jersey City. Guests of honor at the dinner included W. C. Hope, passenger traffic manager of the Jersey Central, and E. D. Osterhout, passenger traffic manager of the Reading.

Advisory Board Meetings in March

The following shippers' advisory board meetings are scheduled for March: the Southeast Shippers' Advisory Board on March 9 at Charlotte, N. C., the Pacific Northwest Advisory Board on March 9 at Roseburg, Ore., the Ohio Valley Advisory Board on March 13 at Columbus, Ohio, the Allegheny Regional Advisory Board on March 15 at Pittsburgh, Pa., and the Trans-Missouri-Kansas Shippers' Advisory Board on March 21, at Kansas City, Mo.

Bill to Restrict Minimum Rate Power Introduced

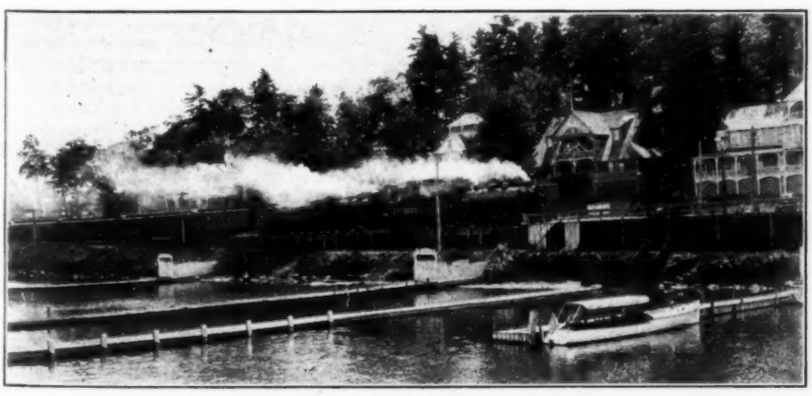
A bill to restrict the power now possessed by the Interstate Commerce Commission to prescribe minimum rates was introduced in the House on March 3 by Representative Newton, of Minnesota, as H. R. 11721. The bill provides that the commission shall not exercise its power to prescribe a minimum rate except where the existing or proposed rate causes an undue or unreasonable prejudice or places a burden on other commerce because so low as to be less than reasonably compensatory.

Mr. Newton issued an explanatory statement saying that this is one of several bills he has been working on in an effort to "restore to the railroads themselves more of the initiative in the making of rates, and in the taking away from the Interstate Commerce Commission a sort of superguardianship power." He said he had withheld its introduction pending a decision by the commission in the lake cargo case, which was handed down on February 25, but that his idea of introducing it antedated not only that decision but a preceding case.

"In the first instance," Representative Newton said, "railroad rates should of course be made by the railroads through their traffic experts. They should be presumed to know what the service is worth, what it costs and what rates will move the commodity to market, etc. The minimum rate power was provided in the law of 1920 and since then there has been a great increase in the number of traffic bureaus that have been exerting themselves to further the particular advantages of their own markets and more and more the commission is being called upon to pass, not on the question of reasonableness, but on whether or not it is advisable for a certain railroad to carry a certain commodity to a certain market at a given rate.

"I maintain that the railroad management itself is the best judge of whether or not that should be done. Now and then the commission's judgment may be sound in passing upon that kind of a case, but, in the long run, the best interests of the country will be served through letting the railroad management exercise its own discretion, subject only to the power of the commission to prescribe reasonable and prevent unduly discriminatory and prejudicial rates. When the commission exercises its present power to substitute its discretion for that of the management, it sets certain artificial barriers against the movement of commerce among the several states, instead of permitting the natural free movement so essential to the industrial and commercial welfare of our country."

* * * *



The Boston & Maine at Weirs, N. H.

Equipment and Supplies

Locomotives

THE SOUTHERN PACIFIC is inquiring for 16 locomotives.

THE BOSTON & ALBANY.—See the item under the New York Central.

THE AKRON, CANTON & YOUNGSTOWN is inquiring for 2 Mikado type locomotives.

THE ILLINOIS TERMINAL COMPANY has ordered a Mogul type locomotive from the Baldwin Locomotive Works.

THE CITY OF SEATTLE has ordered a Prairie type locomotive from the Baldwin Locomotive Works.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA is inquiring for eight 8-wheel switching locomotives.

THE NEW YORK CENTRAL has ordered 5 Hudson 4-6-4 type locomotives and 5 suburban 4-6-6 type locomotives from the American Locomotive Company. These locomotives are for service on the Boston & Albany. The Hudson type locomotive will have 25 by 28 in. cylinders and a total weight in working order of 350,000 lb. and the suburban type will have 23½ by 26 in. cylinders and a total weight in working order of 352,000 lb. Inquiry for this equipment was reported in the *Railway Age* of February 11.

Passenger Cars

THE ILLINOIS CENTRAL is now inquiring for 10 motor cars and 10 trailers for suburban service.

THE CHICAGO, BURLINGTON & QUINCY has ordered six baggage and three passenger baggage cars from the Pullman Car & Manufacturing Corporation. Inquiry for this equipment was reported in the *Railway Age* of January 21.

Freight Cars

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 200 box cars from the Pullman Car & Manufacturing Corporation and 200 from the Seims-Stembel Company. Inquiry for this equipment was reported in the *Railway Age* of February 19.

THE UNION REFRIGERATOR TRANSIT COMPANY has ordered 50 refrigerator cars from the American Car and Foundry Company.

THE DETROIT & TOLEDO SHORE LINE is inquiring for 192 gondola cars of 50 tons' capacity.

THE SAFETY CAR HEATING & LIGHTING COMPANY has ordered 30 special refrigerator cars without ice bunkers from the

American Car & Foundry Company. These cars are to be equipped with the Silica-Gel automatic refrigerator system which was described in the *Railway Age* of February 18, 1928.

THE ST. LOUIS-SAN FRANCISCO has ordered 6 air dump cars of 30 cu. yd. capacity, from the Magor Car Corporation.

THE CHICAGO & NORTH WESTERN is inquiring for 1,000 automoble cars.

Iron and Steel

THE SEABOARD AIR LINE has ordered 175 tons of steel for a bridge, from the Virginia Bridge & Iron Company.

THE READING has ordered 125 tons of bridge steel from the Shoemaker Bridge Company.

Machinery and Tools

THE ATCHISON, TOPEKA & SANTA FE is inquiring for one motor-driven double dry emery grinder and one welding machine.

THE DELAWARE, LACKAWANNA & WESTERN, reported in the *Railway Age* of January 14 as inquiring for about 40 machine tools, has placed orders as follows:

1	42-in. squaring shears	D. Nast Machinery Co.
1	flexible shaft grinder	D. Nast Machinery Co.
1	swing frame grinding machine	D. Nast Machinery Co.
1	slitting shear	D. Nast Machinery Co.
1	50-ton drop pit table	The Whiting Company
1	wheel press gage	Ashton Valve Co.
2	floor grinders	Arch Machinery Co.
1	Dreses radiol drill press	Arch Machinery Co.
2	50-ton hydraulic forcing presses	Chambersburg Eng. Co.
1	steam hammer	Chambersburg Eng. Co.
1	Hanna yoke riveter	Hanna Eng'ng Works
1	Thompson grinder	Percy M. Brotherhood
1	Allen 16-in. sensitive drill	Percy M. Brotherhood
1	20-in. engine lathe	Niles Tool Works
2	electric welding sets	Westinghouse Electric & Mfg. Co.

THE MINNEAPOLIS & ST. LOUIS has ordered a Long & Allstatter No. 1 double end punch and sheer from the Niles-Bement-Pond Company.

Signaling

THE WESTERN OF ALABAMA has ordered from the Union Switch & Signal Company, material for installing automatic block signals on its line, double track, from Oakland City, Ala., to Hulsey, Ga. The order requires 15 semaphore signals, style S.

THE DENVER & RIO GRANDE WESTERN has contracted with the General Railway Signal Company to install automatic block signals, color light, on its line from Cleora, Colo., to Parkdale and from Salida, Colo., to Tennessee Pass, an aggregate length of road of 107 miles.

G. R. S. Dispatching System on T. & P.

The Texas & Pacific has contracted with the General Railway Signal Company for the installation of a dispatching machine with four working levers for Colorado, Tex. The order includes five low-voltage switch machines, five color-light signals and other material.

Supply Trade

J. S. Drillette, general superintendent of the **Louisville Frog & Switch Company,** Louisville, Ky., has been elected vice-president.

C. M. O'Boyle, president of the **Royal Railway Supply Company, Inc.,** has removed his office from 35 Fifth avenue to 90 West street, New York. The offices of the company have also been removed to the same address.

The Globe Steel Tubes Company, Milwaukee, Wis., has opened a district sales office in the Engineers' Bank Building, Cleveland, Ohio, in charge of **W. S. Carson,** formerly representative of Joseph T. Ryerson & Son, Inc., as sales agent.

J. A. Mayer has been appointed Oklahoma manager of the **Graybar Electric Company,** New York. Mr. Mayer's headquarters are at Oklahoma City; **R. W. Conrad** has been appointed sales manager at Tulsa.

A. L. Whipple, who has been a representative of the Locomotive Stoker Company for the past eight years, is now a district sales manager for **The Standard Stoker Company, Inc.,** with offices at 350 Madison avenue, New York City.

The Empire Steel Corporation, Mansfield, Ohio, has completed its organization following the merger of the Mansfield Sheet & Tin Plate Company, Mansfield, the Ashtabula Steel Sheet Company, Ashtabula, the Empire Steel Company, Cleveland, the Falcon Steel Company, Waddell, the Waddell Steel Company and the Thomas Sheet Steel Company, Niles. **W. H. Davies,** president of Mansfield Company, has been elected president of the new company; **J. D. Waddell,** president of the Waddell Company has been elected vice-president; and **W. R. Jenkins,** secretary of the Mansfield Company, has been elected treasurer.

Myron F. Westover, secretary of the **General Electric Company** for the past 34 years, retired on March 1 and **William W. Trench,** assistant secretary, has been elected secretary to succeed him. Mr. Westover has been actively identified with the electrical industry for 40 years, his first position being secretary to the late Charles A. Coffin, then treasurer and manager of the Thomson-Houston Electric Company. Mr. Westover was associated with Mr. Coffin until Mr. Coffin's death in 1926. Mr. Trench, the new secretary, was born 36 years ago in Staten Island. He is a graduate of St. Lawrence University, the Brooklyn Law School and was admitted to the bar in 1916.

Carl F. Gehlen has been appointed assistant to manager railway sales department, of the **E. I. DuPont de Nemours & Co., Inc.,** with headquarters at Parlin, N. J. Mr. Gehlen returns to the service of the company after a year's absence during which time he was associated with L. O. Cameron, railway supplies, at Washington, D. C. He was born in New York City on July 14, 1897, and matriculated at New York University in 1915 in mechanical engineering. He left school to enter the army in September, 1918, and upon his discharge in 1919, became a testing engineer for the Milwaukee Electric Railway & Light Co. He subsequently was engaged in the industrial appraisal business. In 1924 he became assistant sales manager of the Ingersoll Redipoint Company, with headquarters at St. Paul, Minn., which position he held until he went with the DuPont Company in September, 1925.

$600,000,000 Equipment and Steel Merger Rumored

The stock market has been stirred this week by rumors of a possible consolidation of six large equipment and steel corporations with gross assets of about $600,000,000. The rumors reached sufficient proportions to call forth statements from representatives of some of the companies involved, the burden of which was to deny knowledge of such a merger. The companies concerned in reports current are the Baldwin Locomotive Works, the Westinghouse Electric & Manufacturing Company, the Westinghouse Air Brake Company, the American Steel Foundries, American Rolling Mills Company, and the Standard Steel Car Company. The knowledge that in the last year Arthur W. Cutten of Chicago and the Fisher brothers of Detroit, through stock market operations, have gained a control of Baldwin common and the belief that they have acquired an interest in American Steel Foundries and Westinghouse Electric has done much to give body to the rumors. Mr. Cutten has been quoted as saying, "I believe there is something to it, but I can't say anything about it."

Directors of the companies involved have professed an ignorance of there being any such consolidation in prospect. Paul D. Cravath, acting chairman of the Westinghouse Electric & Manufacturing Company, issued a statement, saying "The subject of the merger of the Westinghouse Electric & Manufacturing Company with several other companies as reported in the press is one for the consideration of the individual stockholders of the various companies and has not come before the board of directors of the Westinghouse Electric & Manufacturing Company in any way."

Samuel Vauclain, president of the Baldwin Locomotive Company, when asked by a Railway Age representative as to the probability of such a consolidation, implied that he knew nothing of it, adding that "a president of a company is only the hired man of the board of directors," and that in such a capacity knowledge of anything of the sort would not reach him as soon as it would the board of directors. He

added further that as a director of the Westinghouse Electric & Manufacturing Company, he knew nothing about it. He said that while he had not been to a directors' meeting of the latter company for some time, he had put off a contemplated trip to Florida this week in order to attend a directors' meeting, March 14.

Asked whether or not he saw any advantages to be gained by such a consolidation, he said that he had not studied it carefully enough to know. He said, however, that he approved of commercial and industrial consolidations when properly organized and run. Such consolidations, he said, were to the advantage of not only the industries concerned, but the country at large.

Roy A. Phelps has been appointed district manager of the railway sales department of the **E. I. DuPont de Nemours & Co., Inc.**, with headquarters at Parlin, N. J., handling the company's business in the southeastern territory. He was born on October 22, 1895, at Chicago. He attended public school and high school at Dayton, Ohio, and upon graduation entered the service of the Dayton Tire & Rubber Company, Dayton. Mr. Phelps left the Dayton Tire & Rubber Company in April,

Roy A. Phelps

1917, to enter the service of the U. S. Army, during the period of the late war. Upon his discharge from the army in May, 1919, he went with the sales department of the Sherwin-Williams Company, handling sales for the railway, marine and petroleum division. On January 1, 1926, he was appointed assistant to the manager of the railway sales department of the E. I. DuPont de Nemours & Co., Inc., which position he held until his appointment as above noted.

Chicago Railway Equipment Company

The annual report of the Chicago Railway Equipment Company for 1927 shows undivided profits of $860,920 as compared $948,659 in 1926. Of this amount, $209,774 was paid as dividends on the 120,000 shares of preferred stock and $89,903 as dividends on the common stock, as compared with the same amount of preferred dividends last year and $179,808 common stock dividends. The total number of shareholders decreased from 951 in 1926 to 945 in 1927.

A statement to the stockholders says: "It is believed that the railways have already reached the high mark of efficiency in the utilization of existing facilities. There are those who believe that they have passed the safety mark, and, that in line with the maintenance of the high service the railroads have already performed, with the normal growth of the country, it will be necessary for them to adopt a more liberal policy in car purchasing than that which has prevailed during the last three years. To adopt such a policy would have the logical effect of not only benefiting the railway supply business, but would likewise help general business, as well as that of the railways themselves."

Westinghouse Air Brake Company

The annual report of the Westinghouse Air Brake Company for the calendar year 1927 shows net earnings for the year, after deduction of all expenses, including adequate provision for depreciation of plants and equipment and reserve for federal and other taxes, of $8,520,010. Of this amount $5,946,223 was distributed to the stockholders in dividends and the balance of $2,573,786 was added to surplus account. Net earnings in 1926 were $10,535,062, of which $6,342,099 was paid in dividends and $4,192,963 added to surplus account.

The remarks to stockholders given by H. H. Westinghouse, Chairman and A. L. Humphrey, President, include details as follows:

"The new car and locomotive orders placed by the railroads in 1927 were less than in any year since 1921, resulting in a reduced volume of business in air brake equipment and locomotive stokers; however, the sales of signal apparatus and train control equipment of your subsidiary, the Union Switch & Signal Company, exceeded the figures for 1926, the best previous year in the company's history.

"By action of the stockholders at meeting of August 17, 1927, the capital stock of $50 par value per share was converted into capital stock of no par value at the rate of four shares of no par stock for each $50 par share. It may be of interest to know that at the time of the conversion there were approximately 7,000 stockholders of the company with an average holding of 110 shares, and at December 31, 1927, there were approximately 10,000 stockholders with an average holding of 317 shares of no par stock.

"As of February 1, 1928, the patents covering the manufacture of locomotive stokers and coal pushers and certain other assets, including machinery and inventory, of the Locomotive Stoker Company were sold at a satisfactory price to the Standard Stoker Company, Inc., of New York. The effect of this transaction is not, of course, reflected in the present report which covers the year 1927.

"Owing to the restricted purchases by the railroads as heretofore mentioned, there has been a reduction in the volume of unfilled orders during the year. However, the amount of orders on hand at the first of this year, coupled with the increased booking of orders in the current quarter, indicates a satisfactory volume of business for at least the first half of the year 1928."

SACRAMENTO NORTHERN.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line connecting its Suisun branch with the line of the Petaluma & Santa Rosa at Petaluma, Calif., 36.2 miles, for the purpose of giving the Western Pacific, through the Sacramento Northern, access to territory served by the Petaluma & Santa Rosa, which it is seeking authority to acquire.

Construction

BALTIMORE & OHIO.—This road has let a contract to the Vang Construction Company of Cumberland, Md., for the grading of yard tracks at Maplewood, Ohio, at a cost of $30,000.

CHICAGO & NORTH WESTERN.—This company will close bids on March 9 for the construction of concrete block and tile passenger station 22 ft. by 88 ft., at Carrollville, Wis.

CHICAGO & NORTH WESTERN.—A contract for the construction of a freight station at Appleton, Wis., has been let to E. A. Johnson, Chicago, at a cost of about $55,000.

CHICAGO, BURLINGTON & QUINCY.—This company will close bids on March 12 for the construction of a 45,000-gallon per hour water treating plant at Centralia, Ill. Bids were closed on March 8 for the construction of a 150-ton capacity coaling station at Stockholm, Wis.

CHICAGO, BURLINGTON & QUINCY.—A contract has been awarded to the Roberts & Schaefer Company for the construction of a 50-ton automatic electric shallow pit type locomotive coal handling plant and an N. & W. type single track cinder handling plant at 14th street, Chicago.

CHICAGO, ROCK ISLAND & PACIFIC.—Company forces have begun the construction of an addition to the Armourdale yard at Kansas City, Mo., which with the laying of tracks is expected to involve an expenditure of about $100,000.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—A contract has been let to the McClintic-Marshall Co. of Pittsburgh, Pa., for the reconstruction of a superstructure of a bridge in Louisville, Ky.

DENVER & RIO GRANDE WESTERN.—This company is accepting bids for the construction of five water treating plants in Utah as follows: Cisco, 15,000 gal. of treated water per hour; Helper, 30,000 gal. per hour; Farnham, 15,000 gal. per hour; Westwater, 15,000 gal. per hour; and Greenriver, 30,000 gal. per hour.

LOUISVILLE & JEFFERSONVILLE BRIDGE & RAILROAD COMPANY.—A contract for the reconstruction of the steel superstructure of the bridge over the Ohio river between Louisville, Ky., and Jeffersonville, Ind., has been awarded to the McClintic-Marshall Company, Pittsburgh, Pa. A contract has been let to the Walsh Construction Company, Davenport, Iowa, for the concrete and masonry work in connection with the rebuilding of the bridge and its approaches. The total cost of the project is estimated at $3,250,000.

MANUFACTURERS'.—This company has applied to the Interstate Commerce Commission for authority to build four lines aggregating about 4.5 miles at St. Louis, Mo., connecting its tracks with those of the St. Louis Transfer and the St. Louis Municipal Bridge. This would also af-

ford a connection between the Manufacturers' and the St. Louis & O'Fallon, which is controlled by the same interests, which is connected with the bridge on the Illinois side of the Mississippi river.

MICHIGAN LIMESTONE CHEMICAL COMPANY.—A contract has been awarded to the Roberts & Schaefer Company for the construction of a 150-ton Simplex automatic locomotive coal handling plant at Rogers City, Mich.

MISSOURI PACIFIC.—Bids closed on March 6 for the construction of the substructure of a bridge at Baring Cross, Ark. The entire project will cost approximately $2,000,000.

MISSOURI PACIFIC (St. Louis, Brownsville & Mexico).—An application has been filed by this company with the Railroad Commission of Texas for permission to construct a line between Algoa, Tex., and Dickinson, 9 miles, to form a direct connection between Galveston, Tex., and Brownsville. In the same application the railroad asked permission to construct a line from a point between Brazoria, Tex., and Allenhurst on the Houston-Brownsville line to a point 25 miles northwest thereof.

NEW YORK CENTRAL.—A contract has been let to Henry DuBois' Sons Company, New York, for dredging in the Hudson, Harlem and East rivers in 1928. A contract has also been let to James Stewart & Co., Inc., of New York for alterations of the present structure, construction of overhead roadways along the westerly side of Grand Central terminal and the terminal office building, and over the 45th street viaduct extending to the north building line of 45th street, Grand Central terminal, in New York.

PENNSYLVANIA.—A contract has been let to the T. J. Foley Company, Pittsburgh, Pa., for masonry and roadway excavation for an undergrade bridge at Bird-in-Hand, Pa., which will cost $45,000.

UNION PACIFIC.—The construction of a viaduct over the Union Pacific tracks at Central avenue, Cheyenne, Wyo., to cost $400,000 and another over its tracks at Grand avenue and Fremont street, Laramie, in the cost of which each city will participate is being considered.

Straightening of Chicago River Approved by Illinois Commerce Commission

The straightening of the Chicago River between Polk and Eighteenth streets, which necessitates a rearrangement of the tracks of the railroads passing through this territory, was approved by the Illinois Commerce Commission on March 6 when a resolution was passed authorizing the City to proceed with the work. The project, which involves the removal of a half-mile of the Stream Channel 300 yards to the west, will require the excavation of 950,000 cu. yds. of dirt and 1,000 cu. yds. of ledge rock besides other construction work. The estimated cost of the project is $9,000,000, of which two-thirds will be borne by the railroads.

Railway Finance

BUFFALO, ROCHESTER & PITTSBURGH. — *Operating Contract.*—This company has applied to the Interstate Commerce Commission for authority to operate in freight service over the tracks of the so-called Subway Railroad, owned by the city of Rochester, N. Y., which extends for about 9 miles through the city under an agreement dated January 6.

CANADIAN NORTHWEST.—*Acquisition.*—The Vancouver Holding Company, composed chiefly of London interests, has acquired the Portland Canal Short Line which will hereafter be known as the Canadian Northwest. It extends from Stewart, B. C., at the head of the Portland Canal, up the Bear River valley to Red Cliff, a distance totaling approximately 14 miles.

CANADIAN PACIFIC.—*Acquisition.*—The Canadian Pacific has acquired the Lacombe & Northwestern from the Alberta Government and is operating it as part of the Edmonton division.

CHICAGO, ROCK ISLAND & PACIFIC.—*Increased Dividend.*—Directors at their meeting in New York on March 7 declared a quarterly dividend of $1.50 per share on the common stock, thereby increasing the annual dividend rate on this issue to 6 per cent. The company has been paying common dividends at the rate of 5 per cent annually since March, 1927, the dividends being paid quarterly. The present dividend is payable March 31 to holders of record March 16.

PERE MARQUETTE.—*Extra Dividend.*—Directors have declared an extra dividend of $2 per share on the common stock in addition to the regular quarterly dividend of $1.50 per share, both payable April 2 to stockholders of record March 16. Extra dividends of the same amount were paid in 1926 and 1927.

DENVER & RIO GRANDE WESTERN.—*Bond Offering.*—Kuhn, Loeb & Co. announced an offering on March 5 of $12,000,000 refunding and improvement mortgage 5 per cent bonds, series B, maturing April 1, 1978, at a price of 96 and interest, giving a yield of about 5.23 per cent to maturity. The proceeds of the issue will be applied to the payment on June 1, 1928, of $8,335,000 principal amount improvement mortgage 5 per cent bonds of the Denver & Rio Grande Railroad Company, and to provide in part for the company's improvement program for 1928.

DENVER & SALT LAKE.—*Interest on Income Bonds.*—Directors have authorized the payment of 4½ per cent initial interest on the 6 per cent income bonds out of net earnings for 1927. These bonds in the amount of $11,000,000 were issued in connection with the reorganization plan, with a provision that interest should be payable in multiples of 1 per cent if earned, out of, not to exceed 75 per cent of net earnings.

KELLEY'S CREEK & NORTHWESTERN.—*Bonds Authorized.*—The Interstate Commerce Commission has authorized this company to issue $250,000 6 per cent mortgage bonds, to be delivered to the Kelley's Creek Colliery Company, $200,000 in payment of advances for capital purposes and $50,000 in exchange for a like amount of the carrier's unsecured bonds.

PENNSYLVANIA.—*Call for Annual Meeting.*—The Pennsylvania Railroad Company is mailing to its 143,010 stockholders notice of the annual meeting which will be held on April 10, 1928, in the auditorium of the Insurance Company of North America Building, 16th & Arch streets, Philadelphia. Proxies are being requested in the names of W. W. Atterbury, Effingham B. Morris, Arthur W. Thompson and Lewis Neilson.

The annual election by the stockholders will be held on April 24, 1928. The terms of three directors, Charles E. Ingersoll, Samuel Rea and Edgar C. Felton expire.

In addition to the consideration of the annual report, a lease of the railroad property and franchises of the Pennsylvania Tunnel & Terminal Railroad will be submitted to the stockholders at the approaching meeting. This company, of which the Pennsylvania is the sole stockholder, owns the tunnel line between Manhattan Transfer, N. J., and Long Island City, N. Y., the Pennsylvania's entrance into New York City. The lease is recommended by the board of directors as desirable for economy in operation and accounting. This proposal also is in line with the company's policy, which has been pursued actively for several years, of reducing the number of corporations embraced in the System.

The notice calls special attention to the fact that under the law the proposed lease must receive the approval of two-thirds of the stockholders of the contracting companies, and that to obtain a two-thirds vote is a rather large undertaking in view of the fact that there are approximately 10,000,000 shares of the Pennsylvania Railroad Company's stock in the hands of its shareholders.

SALEM, WINONA & SOUTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon operation of a line from Horse Hollow to Winona, Mo., 21.5 miles, which it has leased from the Current River Lumber Company, which proposes to dismantle the line.

SEABOARD AIR LINE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its Silver Springs branch, 2.05 miles, in Marion county, Fla.

(*Continued on page 609*)

Annual Report

Forty-third Annual Report of the Buffalo, Rochester & Pittsburgh Railway Company, for Year Ending December 31st, 1927

The Directors of the Buffalo, Rochester and Pittsburgh Railway Company submit to the stockholders the following report for the year ending December 31, 1927.

Income

Operating Income:	1927	1926	Increase	Decrease
Revenues	$17,522,080.65	$18,423,272.50		$901,191.85
Expenses	15,485,429.68	14,851,591.83	$633,837.85	
Net revenue	$2,036,650.97	$3,571,680.67		$1,535,029.70
Tax accruals	$336,000.00	$600,000.00		$264,000.00
Uncollectible revenues	597.02	5,128.60		4,531.58
	$336,597.02	$605,128.60		$268,531.58
Total operating income	$1,700,053.95	$2,966,552.07		$1,266,498.12
Non-operating income	841,008.10	864,668.39		23,660.29
Gross income	$2,541,062.05	$3,831,220.46		$1,290,158.41
Deductions for interest, rentals, etc.	2,539,784.78	2,502,925.71	$36,859.07	
Net income—surplus available for dividends	$1,277.27	$1,328,294.75		$1,327,017.48
Return on capital stock	0.01%	8.05%		8.04%

The decreased revenues for the year reduced taxes $264,000, or 44 per cent.

In Non-operating Income the decrease of $108,589.04 in hire of freight cars and rentals of other rolling stock, was partially offset by the increase of $84,928.75 in interest on securities and loans, dividends, etc., making a total net decrease of $23,660.29.

Deductions for interest, etc., increased $36,859.07, caused by the net increase in the funded debt.

The decline in operating revenues, the advance in wages due to arbitration awards, the continuance of program for rebuilding cars, and the retirement of a large number of unserviceable rolling stock units, all combined to reduce the net income to a nominal amount of $1,277.27, compared with $1,328,294.75 the previous year.

Dividends

Dividends, out of the accumulated surplus in Profit and Loss Account, were paid in cash on:

			1927		1926
Preferred stock	$6,000,000	6%	$360,000	6%	$360,000
Common stock	10,500,000	4%	420,000	4%	420,000
Total	$16,500,000		$780,000		$780,000

Since the close of the fiscal year your Board of Directors has declared a semi-annual dividend of three per cent. on the preferred stock and two per cent. on the common stock, payable February 15, 1928.

Capital Stock

There has been no change during the year in this account. The total outstanding capital stock of the Company amounts to $16,500,000, and consists of $6,000,000 preferred stock and of $10,500,000 common stock.

Cost of Road

Capital account was charged during the year with $428,063.60 for investment in road, as follows:

Elimination of grade crossing, Home, Pa.	$34,997.35
Elimination of grade crossing, Rochester, N. Y., Brown St.	9,778.12
Additional sidings, Rochester Belt Line	11,002.45
Additional sidings, Wheatland, N. Y.	16,684.77
Yard tracks, Bradford, Pa.	17,686.36
Yard tracks, Johnsonburg, Pa.	14,523.00
Yard tracks, Falls Creek, Pa.	5,572.83
Automatic flash light signals, various points	4,685.46
Electric crane, Rochester, N. Y.	4,680.68
Improvements, coal trestle, Lackawanna, N. Y.	8,816.34
Additional shop facilities, Lincoln Park, N. Y.	10,562.95
Additional shop facilities, Du Bois, Pa.	13,061.08
Shop machinery	53,510.05
Roadway machines	15,082.73
Improving culverts, bridges and road bed drainage	52,658.46
Increased weight of rail	78,495.91
Increased ballast	45,365.72
Miscellaneous	30,899.34
Total	$428,063.60

Approximately $30,000.00 additional expenditure, mostly for the elimination of grade crossings, will be required to complete all the work undertaken during the year.

Cost of Equipment

Expenditures were made for additions to equipment as follows:

One work equipment car and four miscellaneous equipment cars purchased		$3,773.61
Sundry betterments, including reclassification of two passenger train cars and forty freight train cars		206,344.09
		$210,117.70

There was credited for equipment sold, transferred or destroyed, the following book values:

Five locomotives	$72,350.07	
One passenger train car	12,218.27	
Nine hundred and five freight train cars	852,352.68	
Thirty-three work equipment cars	16,831.57	
Three miscellaneous equipment cars	1,781.42	955,534.01
Making a net credit of		$745,416.31

Four of the lighter type locomotives were sold during the year. In addition six hundred fifty nine freight cars, one work equipment car and three miscellaneous equipment cars were sold.

The rolling stock statistics are affected as follows:

The total tractive power of engines now aggregates 14,354,579 pounds, a decrease of 187,003 pounds during the year.

The average tractive power of each engine increased 401 pounds, being 50,544 pounds as against 50,143 pounds a year ago.

The total carrying capacity of cars in freight service now amounts to 604,428 net tons, a decrease of 33,494.

The average carrying capacity or efficiency of each freight car increased .80 net tons, being 46.32 tons as against 45.52 tons last year.

Of the cars in passenger service 59.46 per cent. are of all steel construction, and in the freight service, 99.35 per cent. of the cars are all steel, or are equipped with steel underframes.

The following table indicates the relative changes in equipment for the past ten years:

	Tractive power of engines in pounds.		Capacity of cars in freight service in tons of 2,000 pounds.	
	Average of each engine	Aggregate tractive power	Average of each car	Aggregate capacity
1918	43,312	16,025,362	43.94	777,657
1919	44,100	15,346,830	43.97	771,541
1920	45,630	14,281,845	44.12	748,215
1921	46,400	13,688,103	44.20	737,255
1922	46,630	13,522,696	44.37	727,382
1923	49,700	14,810,676	44.63	705,525
1924	49,886	14,716,267	44.91	692,450
1925	49,958	14,637,809	44.96	681,690
1926	50,143	14,541,582	45.52	637,922
1927	50,544	14,354,579	46.32	604,428
Increase over 1918	7,232	(Dec.) 1,670,783	2.38	(Dec.) 173,229
Per cent	16.70	(Dec.) 10.43	5.42	(Dec.) 22.28

Leased Lines

The following advances were made this year for additions and betterments to leased lines:

	Allegheny & Western Railway	Clearfield & Mahoning Railway	Mahoning Valley R. R.	Total
Improvements on leased railway property	$59,218.56	$28,676.21	$1,099.37	$88,994.14
Less retirements	64,191.26	949.28	.....	65,140.54
Net Credit		$27,726.93	$1,099.37	$23,853.60
Net Debit	$4,972.70			

The total net credit to date for advances to leased lines is as follows:

Allegheny & Western Railway	$956,451.19	
Clearfield & Mahoning Railway	416,495.52	
	$1,372,946.71	
Less Mahoning Valley R. R.	184,420.01	
Total Net Advances		$1,188,526.70

Passenger Revenues

The gross passenger revenue amounted to $1,085,138.37, a decrease of $164,873.02 or 13.19 per cent. compared with 1926. The loss of this traffic is due entirely to the public using motor busses and privately owned automobiles in preference to the railroads.

[Advertisement]

This is evidenced by the following statistics indicating the steady decrease in local or short haul business:

Year	Average miles carried	Passenger miles	Passenger revenue
1923	31.7	$4,902,112	$1,762,856
1924	32.5	51,900,115	1,628,372
1925	34.2	46,935,307	1,442,158
1926	36.7	41,089,394	1,250,011
1927	37.6	36,452,021	1,085,138

The average rate received per passenger per mile decreased .065 cent, being 2.977 cents as compared with 3.042 cents the preceding year.

The average distance each passenger was carried increased .9 miles, being 37.6 miles against 36.7 miles.

Passengers carried in 1927	970,205	
Passengers carried in 1926	1,119,863	
A decrease of 13.36 per cent., or		149,658
Passengers carried one mile in 1927	36,452,021	
Passengers carried one mile in 1926	41,089,394	
A decrease of 11.29 per cent., or		4,637,373

Freight Revenue

The gross freight revenue amounted to $15,800,752.50, a decrease of 4.33 per cent., or $714,838.97 compared with 1926.

The average rate received per ton mile decreased .015 cent, being .871 cent compared with .886 cent for the same period in 1926.

The average distance each ton was hauled increased 4.96 miles, being 156.99 miles, against 152.03 miles last year.

The bituminous coal handled decreased 3.93% due to the depression of the industry in Central Pennsylvania.

There was also a shrinkage in coke, iron ore, pig and bloom iron tonnage amounting to 337,177 tons, or 58.83%, due to several blast furnaces on line of road being closed down the entire year.

The volume of other freight fell off 108,944 tons, or 2.22%, caused by the decreased movement of road making materials due to lessened road building operations adjacent to our lines.

The revenue tonnage moved was as follows:

	1927	1926	Decrease
Bituminous coal	6,511,924	6,778,436	266,512
Coke	121,434	242,757	121,323
Iron ore	492	109,250	108,758
Pig and bloom iron	114,079	221,175	107,096
Other freight	4,803,049	4,911,993	108,944
Total	11,550,978	12,263,611	
A decrease of 5.81 per cent., or			712,633
Tons moved one mile in 1927			1,813,434,150
Tons moved one mile in 1926			1,864,443,909
A decrease of 2.74 per cent., or			51,009,759

The average number of revenue tons carried one mile per revenue freight train mile, excluding the mileage of helping engines, decreased 45.36 tons, being 778.52 tons against 823.88 tons a year ago.

The average number of revenue tons carried one mile per revenue freight engine mile, including mileage of helping engines, decreased 20.51 tons, being 534.98 tons against 555.49 tons a year ago.

The averages for the past ten years are as follows:

	Train load.	Engine load.
1918	943	602
1919	884	586
1920	943	602
1921	754	520
1922	790	534
1923	850	554
1924	736	515
1925	756	523
1926	824	555
1927	779	535

The non-revenue freight traffic, not included in any other figures of this report, is as follows:

	1927.	1926.
Number of tons	956,506	951,431
Number of tons carried one mile	90,561,009	86,594,101

Operating Expenses

Operating expenses increased $633,837.85 or 4.27 per cent., as follows:

	Increase.	Decrease.	Per Cent.
Maintenance of way	$19,104.50		0.85
Maintenance of equipment	396,261.51		7.54
Traffic	14,286.13		4.17
Transportation	216,277.10		3.36
Miscellaneous operations	1,924.91		6.49
General		$7,776.10	1.44
Transportation for investment—Cr.		6,240.20	34.26
Total	$633,837.85		4.27

The increased expenses are due to a great extent to advances in wages awarded by arbitration boards, affecting shopmen, firemen and oilers in December, 1926, and remaining classes of employees between January 1 and August 1, 1927, thereby adding $369,936 to the payrolls of your company for this year.

The increase in Maintenance of Way expenses include the insertion of 29,971 more creosoted ties this year than last, and extraordinary work of surfacing the tracks, widening cuts, cleaning ditches and perfecting drainage.

The program of heavy repairs to freight cars and retirement of unserviceable cars referred to in last year's report was continued during the year.

An increase in the price paid for supply coal added $33,018 to Transportation expenses.

The operating ratio is 88.38%, an increase over the preceding year of 7.77%.

The percentage of each group of operating expenses to the operating revenue for the past seven years is as follows:

	1927.	1926.	1925.	1924.	1923.	1922.	1921.
Maintenance of way	13.00	12.25	12.68	10.74	17.77	14.28	13.75
Maintenance of equipment	32.24	28.52	27.34	29.36	32.14	38.85	34.18
Traffic	2.04	1.86	1.97	1.93	1.40	1.42	1.50
Transportation	38.02	34.99	37.62	39.12	38.29	40.07	43.33
Miscellaneous operations	.18	.16	.18	.18	.15	.17	.21
General	3.04	2.93	2.98	3.07	2.33	2.83	3.38
Transp. for Inv.—Cr.	.14	.10	.10	.08	.48	.09	.01
	88.38	80.61	82.67	84.32	91.60	97.53	96.34

The average cost per ton mile is .735 cent, an increase of .053 cent over last year.

General Remarks

The proposed lease of your property to The Delaware & Hudson Company was authorized by the stockholders of both railroads in September, 1925, subject to the approval of the public authorities. In July, 1926, the Delaware & Hudson filed its application with the Interstate Commerce Commission for approval of the lease. In November, 1926, an examiner of the Commission filed a "proposed report" adverse to the lease, citing as an important objection thereto the lack of a physical connection between the two railroads. Following such report The Delaware & Hudson Company effected a trackage arrangement with the Pennsylvania Railroad Company between Buttonwood and Du Bois, both in Pennsylvania, thus forming a physical connection with our line and submitted such arrangement also to the Interstate Commerce Commission for approval. Your Board of Directors deeming it important that there should be a reasonably prompt determination as to whether the lease was to become effective, had reserved the right to terminate its commitment, if the required approval of the Interstate Commerce Commission was not obtained by December 31st, 1926. Subsequently at the suggestion of the Interstate Commerce Commission the time was extended to March 1st, 1927. As no decision had been made by the latter date, formal action terminating our commitment was taken by your Board of Directors on March 2nd, 1927. You were fully advised concerning this action in my letter of March 11th, 1927. Notwithstanding such termination of our commitment, the Delaware & Hudson continued to press its application before the Interstate Commerce Commission, and the Commission considered that it should exercise jurisdiction to pass upon the case.

The Interstate Commerce Commission on December 29th, 1927, by a majority vote of six to five, announced its decision denying the applications for approval of the proposed lease and trackage agreement. If the decision had been favorable, the lease would have been re-submitted to our stockholders for consideration anew.

It is evident from the opinions of the various Commissioners that an important consideration in their adverse decision was the fact that the general question of consolidation of railroads in our section of the country was still undecided.

All the protests and hearings in relation to the tentative valuation of the property of your Company and its leased lines are concluded and the final briefs were filed with the Interstate Commerce Commission on October 15, 1927. It is expected that the Commission will publish the final value some time during 1928.

The cost of valuation work to date has reached $394,105.52, of which $69,005.20 was assumed by the U. S. Railroad Administration.

The Ontario Car Ferry Company, Limited, paid a dividend of 5% for the year ending December 31st, 1926. The sum of $12,500 received on the $250,000 of this Company's stock was credited to Non-operating Income Account.

The dividends paid by the Water Companies out of the earnings of 1926 and 1927, as follows:

Ketner Water Company	$92,000	stock	@	16%	$14,720.00
Kyle Water Company	85,000	"	"	24%	20,400.00
Cloe Water Company	55,000	"	"	21%	11,550.00
Cummings Water Company	60,000	"	"	9%	5,400.00
Total					$52,070.00

were also credited to the same account.

The acknowledgments of the Board are renewed to its officers and loyal employes for their faithful and efficient service.

By order of the Board.

WILLIAM T. NOONAN,
President.

Rochester, N. Y., February 13th, 1928.

[ADVERTISEMENT]

Financial

(*Continued from page 606*)

SOUTHERN PACIFIC.—*Bonds Authorized.* The Interstate Commerce Commission has authorized this company to issue $29,400,000 4½ per cent bonds to be sold to Kuhn, Loeb & Co. at 97¼, giving an average annual cost to the carrier of 4.652 per cent. The proceeds are to be used to retire a like amount of outstanding 5 per cent bonds or to reimburse the treasury for such retirement. The public offering of these bonds took place on January 31.

ST. LOUIS-SAN FRANCISCO.—*New Financing.*—Speyer & Co., J. & W. Seligman & Co., and the Guaranty Company of New York announced an offering on March 2 of $100,000,000 consolidated mortgage 4½ per cent gold bonds, Series A, due March 1, 1978. In connection with this financing the same bankers are heading a syndicate to underwrite the issue of over $49,000,000 6 per cent preferred stock, which is to be offered at par to the common stockholders of the railway company. The bonds were priced at 97 and accrued interest to yield about 4.65 per cent.

The issuance and sale of the bonds are subject to the approval of the Interstate Commerce Commission and of the stockholders of the company.

This is one of the largest railroad refunding operations in years. A material improvement in the capital structure of the railroad company will be accomplished through the sale of these $100,000,000 4½ per cent bonds under the new consolidated mortgage and through the issue of over $49,000,000 6 per cent preferred stock. Funded debt will be reduced by $26,292,000 and will be about 2.4 times the capital stock as against about 4.2 times as at present; fixed and contingent interest charges will be reduced by over $2,900,000 per annum.

The proceeds of this financing will be used to pay $126,292,000 bonds and notes (of which $103,073,000 bear interest at the rate of 6 per cent and $17,173,000 at the rate of 5½ per cent), to retire $7,500,000 6 per cent preferred stock, and to provide about $9,000,000 for corporate purposes. Of the bonds bearing 6 per cent interest to be paid off, over $75,000,000 are adjustment mortgage bonds and income bonds.

The new consolidated mortgage bonds will be secured:

(a) By deposit of over $66,630,000 underlying bonds ($47,630,000 St. Louis-San Francisco prior lien mortgage bonds and over $19,000,000 Kansas City, Fort Scott & Memphis refunding mortgage bonds);
(b) directly, or through pledge of all outstanding securities, on 4,292 miles of road of the St. Louis-San Francisco system proper, together with equipment, terminals, shops, etc.
(c) by substantially all the stock or properties of the Kansas City, Fort Scott & Memphis, owning or controlling 1,331 additional miles of road;
(d) by all properties hereafter acquired with the proceeds of consolidated mortgage bonds.

The total income for the year 1927 was equal to over 1.9 times the annual interest charges (about $12,346,000) on the funded debt after completion of this financing, and the average for the past five years was equal to 1.8 times such interest charges.

New Preferred Stock.—Common stockholders were notified on March 2 that, in connection with the refunding plans which involve the sale of $100,000,000 4½ per cent bonds, holders would be given the right to subscribe at par for $49,157,400 6 per cent preferred stock.

The rights to subscribe will be in the ratio of three-fourth share of preferred stock for each common share held and will expire at 2 p. m. on May 15. The payments must be made for 50 per cent of the subscription by May 14, 25 per cent by June 29 and 25 per cent with adjustments for accrued dividends and interest by September 28.

VIRGINIAN TERMINAL.—*Bonds Authorized.*—The Interstate Commerce Commission has authorized this company to issue $100,000 first mortgage bonds, to be delivered to the Virginian in payment of advances. The Virginian has been given authority to assume obligation and liability and to pledge the bonds with the trustee of its first mortgage dated May 1, 1912. It has also been authorized to procure authentication and delivery of a like amount of first mortgage 5 per cent 50-year bonds.

WESTERN NEW YORK & PENNSYLVANIA.—*Readjustment.*—The Interstate Commerce Commission has authorized this company to issue $7,009,869 non-cumulative 5 per cent preferred stock and scrip and $23,846,951 common stock and scrip, the stock to be represented by shares of the par value of $50 each. The preferred stock is to be exchanged for the carrier's outstanding common stock and income mortgage bonds, practically all of which are owned by the Pennsylvania. The common stock is to be delivered at par to the Pennsylvania in payment of advances.

Valuation Reports

The Interstate Commerce Commission has issued final valuation reports finding the final value for rate-making purposes of the property owned and used for common-carrier purposes as of the respective valuation dates as follows:

Grand River Valley.....	$260,250	1919
Electric Short Line Terminal Co.	$935,000	1920

Dividends Declared

Northern Pacific.—1¼ per cent, quarterly, payable May 1 to holders of record March 13.

Old Colony.—1¾ per cent, quarterly, payable April 2 to holders of record March 10.

St. Louis, Rocky Mountain & Pacific.—Common, ½ per cent, quarterly; preferred, 1¼ per cent, quarterly, both payable March 31 to holders of record March 15.

Average Price of Stocks and of Bonds

	Mar. 6	Last week	Last year
Average price of 20 representative railway stocks..	116.96	116.21	105.36
Average price of 20 representative railway bonds..	96.76	96.93	93.29

THE PENNSYLVANIA is inquiring for 250 tons of steel for use at Akron, Ohio, and have ordered 700 tons from the Bethlehem Steel Company for a bridge at Philadelphia, and 100 tons from the Shoemaker Bridge Company for a bridge near Philadelphia.

Officers

Executive

Thomas Nelson Perkins, a Boston lawyer and a member of the board of directors of the Boston & Maine, has been elected chairman of the executive committee, succeeding **Homer Loring,** resigned.

L. A. Beck, tie and timber agent of the Norfolk Southern, with headquarters at Norfolk, Va., has been appointed assistant to the president, with the same headquarters, and the positions of vice-president and general manager and tie and timber agent have been abolished.

Robert T. Rossell, vice-president of the Bessemer & Lake Erie and the Union Railroad, with headquarters at Pittsburgh, Pa., has been elected president of the above mentioned companies, with the same headquarters, succeeding **James H. Reed,** deceased.

Charles Barham who has been elected vice-president and traffic manager of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., returns to that railroad after a period of six years during which time he served as chairman of the Southern Freight Association at Atlanta, Ga. Mr. Barham was born on April 16, 1867, and entered railway service 20 years later as a stenographer in the office of the general claim and forwarding agent of the Richmond & Danville (merged with the Southern) at West Point, Va. In 1920 he became a stenographer to the commissioner of the Associated Railways of Virginia and the Carolinas at Richmond, Va., serving as soliciting freight agent for the Southern at Richmond and New York from 1895 to 1897 when he was appointed chief clerk to the general freight agent at Norfolk, Va. For the next nine years he was successively foreign freight agent for the Southern at Norfolk, chief clerk to the traffic manager of

Charles Barham

the N., C. & St. L. at Nashville and assistant general freight agent of that railroad at the same point. Mr. Barham was promoted to general freight agent of the N., C. & St. L., with headquarters at Nashville, in September, 1906, being appointed traffic manager for the southeastern states under the United States Food Administration at Atlanta in March, 1918. Two years later he returned to the N., C. & St. L. as general freight agent, resigning in 1922 to become chairman of the Southern Freight Association. Mr. Barham's election as vice-president and traffic manager became effective on March 1.

Financial, Legal and Accounting

Lucian H. Cocke, Jr., assistant general attorney for the Norfolk & Western with headquarters at Roanoke, Va., has been appointed general attorney, with the same headquarters, succeeding his father, the late **Lucian H. Cocke, Sr.**

Operating

H. J. Hadden, purchasing agent of the Chicago, Springfield & St. Louis, with headquarters at Springfield, Ill., has been appointed assistant to the general manager of that road and of the Jacksonville & Havana, with the same headquarters.

B. C. Murphy, acting trainmaster on the Paragould district of the Missouri Pacific, between Helena Crossing, Ark., and Lexa Yard, the Latour, Clarendon and Brinkley districts and Helena terminal, with headquarters at Wynne, Ark., has been appointed trainmaster on all districts of the Louisiana division, with headquarters at Monroe, La., succeeding **H. P. Stark,** who has resigned to engage in other business.

C. P. Dugan, superintendent of transportation of the Norfolk Southern, with headquarters at Norfolk, Va., has been appointed general superintendent, steam lines, with the same headquarters and the position of superintendent of transportation has been abolished. Mr. Dugan was born on November 1, 1882, at Mauch Chunk, Pa., and entered railroad service in June 1899. He served consecutively until June 1, 1901, with the Lehigh Valley, as messenger and clerk to trainmaster, stenographer and yard clerk. At the latter time he became chief clerk to the general yardmaster of the New York Central & Hudson River (now part of the New York Central), with headquarters at New York. From January 1, 1902, until November, 1902, Mr. Dugan served in a similar capacity on the Grand Trunk at Montreal, Que., and from the latter time until August, 1903, he occupied various positions on the Pennsylvania & New York division of the Lehigh Valley. From August, 1903, until November, 1905, Mr. Dugan served consecutively as telegraph operator, secretary to the superintendent, extra dispatcher and chief dispatcher of the Chattanooga division of the Cincinnati, New Orleans & Texas Pacific (now part of the Southern). From November, 1905, until June 1, 1910, he served successively as car accountant and chief clerk to the president and general manager of the Norfolk Southern. From June 1, 1910, until July 1, 1918, Mr. Dugan served as superintendent of transportation of the same road at Norfolk, Va., and from the latter date until March 1, 1920, during federal control, he served as superintendent of transportation of that road and of the Virginian. Since March 1, 1920, he has been superintendent of transportation of the Norfolk Southern at Norfolk.

Traffic

John E. Tilford has been elected chairman of the Southern Freight Association to succeed **Charles Barham,** resigned.

O. C. Olsen, foreign freight agent of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to general freight agent, with jurisdiction over export, import and coastwise traffic and headquarters as before at St. Louis. **W. F. Stevens,** chief clerk to the freight traffic manager at St. Louis, has been promoted to assistant general freight agent at that point.

Robert Thomson, assistant general passenger agent of the Chicago & North Western, with headquarters at Chicago, has been promoted to assistant passenger traffic manager, with

Robert Thomson

headquarters at the same point. Mr. Thomson has been connected with the traffic department of the North Western for more than 28 years, starting in 1899 as a rate clerk at Chicago. He was born on May 15, 1876, at Edinburgh, Scotland, and received his education in the public schools of that country, entering railway service in the passenger traffic department of the Chicago & Grand Trunk (now part of the Grand Trunk Western) in 1890. Nine years later he became a rate clerk on the North Western, later being advanced to chief rate clerk at Chicago. Mr. Thomson was promoted to assistant general passenger and ticket agent at Chicago in 1916 and in 1920 his title was changed to assistant general passenger agent. His promotion to assistant passenger traffic manager became effective on March 1.

Edward L. Pardee, assistant general passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., has been promoted to general passenger agent, with headquarters at the same point, succeeding **George H. MacRae,** who has retired from active service. **Forrest A. Brown,** general agent in the passenger department at Minneapolis, Minn., has been promoted to assistant general passenger agent to succeed Mr. Pardee. **W. L. Mansfield,** general agent in the passenger department at St. Paul, has been promoted to assistant passenger agent, with headquarters at the same point.

S. S. Butler, freight traffic manager of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., has been promoted to general freight traffic manager, with headquarters at the same point. **J. N. Cornatzar,** passenger traffic manager, with headquarters at St. Louis, has been given the additional title of director of development. **B. H. Stanage,** assistant freight traffic manager, with headquarters at St. Louis, has been promoted to traffic manager in charge of all Interstate Commerce Commission matters for the Frisco, with headquarters as before at St. Louis. **Robert N. Nash,** assistant freight traffic manager, has been promoted to freight traffic manager, with headquarters at St. Louis, succeeding Mr. Butler. **J. M. Strupper,** assistant general freight agent at St. Louis, has been promoted to assistant freight traffic manager, replacing Mr. Stanage.

Special

Pitt P. Hand, publicity manager of the New York Central Lines, with headquarters at New York, has resigned, and **C. W. Y. Currie** has been appointed acting publicity manager.

Andrew Allerton, formerly general superintendent of the Canadian Pacific hotel system, has been appointed general manager of the Canadian Pacific hotels and bungalow camps east of Fort William, Ont. He thus assumes charge of a group of hotels that includes the Chateau Frontenac at Quebec, and the Royal York at Toronto, which is to open in the spring of 1929.

Obituary

Samuel D. Webster, statistician of the St. Louis Terminal Railroad Association, died on February 29 from pneumonia.

Edmund C. Pechin, who was vice-president and general manager of the Ohio & Northwestern (now the Cincinnati district of the Norfolk & Western) in 1887, died on February 5 at his home, Greyledge Farm, near Buchanan, Va. Mr. Pechin was 93 years of age.